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ABSTRACT

An extensive investigation of elementary school classrooms was conducted through the collection and statistical analysis of student and teacher responses to questions concerning the educational environment. Several asepcts of the classroom are discussed, including the spatial, thermal, luminous, and aural environments. Questions were organized so as to gain data on--(1) effects of environmental factors, (2) attitudes towards the environment, (3) cultural and social factors which might affect the study, and (4) correlation between environmental factors and attitudes. Results are given in tabulated form and some preliminary conclusions are made. An extensive bibliography is included. (RS)

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THE ELEMENTARY SCHOOL AND ITS POPULATION

PHASE 2

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THE ELEMENTARY SCHOOL CLASSROOM.

The Study of the Built Environment through Student & Teacher Responses

Based on a Survey (Phase 1),
by the Author, of
32 Schools in the Region of
Greater Montreal,
Province of Quebec,
Canada

A Master's Thesis by

VREJ-ARMEN ARTINIAN

M. Arch.

School of Architecture
McGill University
Montreal, July 1969

TO CHILDREN

"We owe it to the children, to provide them... with the conditions which will most favour their development into full human beings, excelling in the powers of coherent action, logical thought, & sensitive appreciation of all the values which human beings can learn to divine - this last being the most important dimension of their humanity. Our most notable lack today would seem to be not men of action with their hands on instruments of power; nor calculating geniuses, supported by giant computers; but men of sensibility, gifted to appreciate and value human life."

Sir Geoffrey Vickers (See Ref. X-5(B), p.41)

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- The architects of those buildings,

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- And last, but not least, my wife Nazig, for her ample assistance.

ABBREVIATIONS

In the various parts of this work the reader will encounter abbreviations which are explained below:

A	acrylic shade
A	adequate
apart.	apartment
App.	appendix
apt.	apartment
atm.	atmosphere
attit.	attitudes
ave.	average
BA	barely adequate
blg.	building
brd.	board (chalk)
C	cloudy
Cl.	ceiling
conc.	concrete
CR	classroom
D	dark
DB	dry bulb
E	electricity
Eff.	effective
Eng	English
env.	environment
envir.	environment
F	fluoresent
F	forced air
Fl.	floor
FP	fixed partitions
Fr	French
ft-cand.	foot-candles
ft-cndles	foot-candles
HS	hazy sun
I	incandescent
IA	inadequate
L	light
L	louvred luminaire
L	lower (income)
LM	lower middle (income)
LR	long-rectangle
lam.pl.	laminated plastics
lang.	language
lum.	luminous
lum.	luminaire(s)
M	medium
M	middle (income)
ment.	mental
met.	metal
MH	mental health
Ms	means
nat.	natural
NP	no partitions
NSQ	nearly square
O	open plan
OP	operable
$p \simeq$ $p <$	probability(of variation by chance)nearly equal to,or smaller than(given when Chi sq.is significant
PH	physical health
phys.	physical
r	coef.of correlation
rect.	rectangular
Ref.	reference(s)
RH	relative humidity
S	suburban
S	sunny
S/U	semi-urban
sch.	school
sec.	section
shpd	shaped
SQ	square
st.	student(s)
stud.	student(s)
sub.	suburban
teach.	teaching
temp.	temperature
therm.	thermal
TM	teaching method
U	upper (income)
U	urban
urb.	urban
V	ventilation (exhaust grille)
v-a	vinyl asbestos
vent.	ventilation
W	hot water heater
Wl	walls
WR	wide-rectangle

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PROLOGUE

1. INTRODUCTION

(See REF.)

This study aims to examine the interaction of Man & His Physical Environment in the context of the Elementary School Buildings, & tries to appraise the performance of the latter based not upon technical & objective criteria but subjective preferences of the occupants.

Our attention is focused on a series of correlated questions in different fields of specialities.

This study does not point out & try to solve ecological problems which arise from the physical environment of the schools. That is the field of ecologists.

It does not point out & try to solve sociological problems which are inherent in any institution like schools. Sociologists would be best qualified to do that.

It does not point out & try to solve educational problems resulting from the architecture of the school. Educators should do that.

It does, however, make us aware that Architecture does not exist without these issues; indeed it is in the satisfaction of all these & other needs that the physical environment has its raison d'être.

Man is usually unaware of the extent of the influences of architecture on himself, and as Sommer points out, He is unable to express how He feels in different surroundings. II-31(A) Perhaps this is because, in Moller's words, "...there is an overall effect exerted upon one's consciousness by architectural spaces (& highly significant in determining mental health or illness) which defies precise definition." II-17(B) p.22

We should not then be surprised that, as Sanders has found, teachers & administrators be "remarkably insensitive to the connection between the physical environment & educational program." III-17(A)

Suprisingly enough, we, architects too, know very
little about the extent of the influences of the
physical environments we create. Architects learn
about materials & structures through systematic
research, "but in the behavioral realm, the way
buildings affect people, architects fall back on
intuition, anecdote, & casual observation," remarks
Sommer. And Wehrli adds: "The architect can no II.20(B)p.6.
longer defend his position by intuition alone, but
must begin to support it with a thorough knowledge
of human motivation, perception, learning, growth
& development, & in brief, the full gamut of human
behaviour." II.4(B)p.11

Considerable research has been already done in establi-
shing optimal limits for comfortable vision, pain-
less audition, or soothing temperatures, but, warns
Parr, "a comfortable body is no guarantee of a
comfortable mind," & environment influences us in
very indirect ways of which we know almost nothing. II.26(A)
"Conventionally, research into environmental design
considers only single factors - not their inter-
action," writes Manning. Each specialist gives
information about one aspect, while in the "best
total design" there will be a "combination of
compromised factors" which is not studied at all. I-4(B) p.21

Fortunately in the recent years more than one
behavioral scientist or architect has undertaken
to study the interaction of Man & His Environment
as related to Architecture, or the Physical Sur-
roundings. Sommer has studied the ways physical (see REF-II)
arrangements (like seating patterns or bed posi-
tions) can interact with the tasks being carried
on in a given space. Hall investigated the II-20 (B)
effects of different cultural backgrounds. Hamaty II-12(B),ch.11
considered the influences of the socio-economic
level of school neighborhoods. Barker showed the II-18 (A)
behavioral differences of children in schools of
large & small enrollments, while Gang's research II-1(A), II-3(
dealt with the age of the school building. II-14 (A)

As the reader will see in the References, the effects of the different factors of the physical environment are examined in various degrees of depth & from various points of view.

All these studies, underlining the importance of
the physical surroundings, have induced people
like Moller to claim that,"No architectural space
should be conceived as having any character, any
reality, apart from the human perceptions & uses
to which it is to be subjected." René Dubos has II-17(B) p.
even asserted that "To a very large extent, the
physical appearance & mental characteristics of
the adult are ... the products of the responses
made to the total environment during the formative
years." II-7(B) p.1

Needless to say, in the school building children will receive most important environmental messages which might very well reverberate in their minds throughout all their life.

One, perhaps the most enduring of these messages,
is the appreciation of beauty. "Children thrive
when they can touch, breathe, see, hear, & feel
beauty ... the bricks & mortar of the schools are
themselves the 'silent teachers'." The whole X-5(B) p.60
outlook of the students can be conditioned by
what they find around them.

On one hand, "Schools... with drab, totally 'blah'
rooms & halls done in eye-saving green & dirt-
obscuring brown may... produce well informed young
adults but not ones with original ideas." On the VIII-7 (A)
other hand well designed schools can "stimulate
their imaginations & develop their awareness of
life.". II-13 (A)

As Taylor puts it, "The child needs to be able to
act on his environment for himself, to change it,
to become aware of it by working in it, to see
what shapes, forms, colours, sounds & ideas it
contains. To deprive him at an early age of this
opportunity to explore is to arrest a necessary
part of his development." II-36 (A)

To sum it up, " the moderns school must do more
than house the learner, It's very appearance must
be an invitation to adventure." X-5(B).p.89

In order to understand the unknown particulars of a building, & whether or not it succeeds in its performance not only to facilitate the activities it is supposed to house, but also to give that

"joie de vivre", so requisite for children's surroundings, one has to be thoroughly documented on II-9(A)
the total needs of the occupants.

Architects will need the cooperation of many behavioral scientists in order to achieve that goal.
Moller suggests that psychiatric, sociological & statistical findings be available to us. I would II-17(B).p.10
also add that biological, bio-chemical & bio-physical findings be at our disposal just as easily as structural & other data are.

This Thesis is a one-sided way of documentation. I do wish that specialists other than architects could also peruse this work (Phases 1 & 2) & cull results of their own.

Several aspects of the physical environment in the school are dealt with & more or less original results are yielded.
In Part One the Spatial, Thermal, Luminous and Aural Environments & their interactions are examined, in Part Two, the Attitudes of the Students & the Teachers, as related to the physical environment, & in Part Three, the effects of Cultural, Social & other factors; in Part Four the Most Liked & the Least Liked Classrooms are compared.

2. METHODOLOGY

THE BASIS OF THE THESIS

Phase 1 of this study is a survey (700 pages) conducted on 32 elementary school buildings in the Region of the Greater Montreal in the winter of 1968-69. (see App.-p.53.)

The Choice of the Samples

Because of the limited time only elementary schools were chosen, all built between 1950-1968 (only a part of one school dates from the beginning of the century). Half the number of schools belongs to the French-speaking & the other half to the English-speaking ethnic[+]groups. They are spread over Lower, Lower Middle, Middle & Upper income level districts, & Urban, Semi-urban & Suburban localities. These categories were determined mainly through "60 Major Study Areas & their Comparative Socio-Economic Profile in Metropolitan Montreal", a statistical work based on the 1961 Census & published in July 1968 by the Research Department of the Montreal Council of Social Agencies.

The Visits

Most of the architects who had designed those 32 buildings were interviewed before the actual visits to the schools took place. Then, half a day was devoted to each school where the principal was interviewed also. A short tour around the plant was followed by attending a regular class of the highest grade for approximately half an hour. Questionnaires, distributed to the pupils of that class (a sample in each school), as well as to the teachers of the school, were completed and were collected at a later date. The total number of the pupils answering is about 800, while the number of the teachers is 400.

[+] Although some other ethnic groups too are found in both the Fr-speaking & the Eng-speaking schools, the vast majority of their students, however, belong to the French or English (Anglo-Saxon, Scottish & Irish) groups respectively, therefore I have not considered the presence of the others.

The Computations

The completed questionnaires were transposed on computer cards, all the categories of the above mentioned classification being coded to facilitate groupings. The results were thousands of frequency and percentage distribution tables with their corresponding chi squares.

The interviews, the observations during the visits, as well as the responses to the questionnaires & teachers' comments were presented as a collection of individual reports on the 32 schools.

THE THESIS

Phase 2 constitutes the present Thesis which makes use of only a small part of the information found in Phase 1. The remainder requires additional time & financial means in order to be examined & analysed, a thing which the author cannot afford to do without substantial assistance by a foundation or an institution.

The topic chosen is the classroom (CR), that element of the school building which houses the learning activities more often than any other space.

All the questions related to the CR are taken into consideration & presented in the Appendixes.

The average of the maximal & minimal quarters of the responses to each question are calculated without the aid of the computers. Afterwards, the latter have done the statistical verifications (r, the coefficient of correlation).

Each part of this study is followed by summaries of the findings, graphs for easier comprehension of the results, & a short conclusion.

I would caution the reader against generalizing the conclusions which appear in any part of the thesis. They are hypothetical, & based only on the data pertaining to the 32 schools of the sample. Appendixes contain all the data & the statistical verifications whenever applicable. An extensive classified bibliography terminates this work.

PART ONE

THE ENVIRONMENTAL FACTORS

1.1. THE SPATIAL ENVIRONMENT

1. ACTUAL AREA OF THE CLASSROOM)
2. ACTUAL NUMBER OF STUDENTS PER CLASSROOM)(See App.1,Sec.1.0.)
3. AREA PER STUDENT)
4. RELATIONSHIPS BETWEEN 1,2 & 3. (See App.3, Sec.1.1.)

In the 32 samples of this study, the average classroom has:

- 725 square feet surface area
- 28 students
- 26 square feet per student

Each of these figures varies from one school to another in different proportions. At the extremes, these figures are as follows:

Area: min. 650 sq.ft. (25 students,26 sq.ft./st.)
max. 860 sq.ft. (30 students,28.5 sq.ft/st.)

Number: min. 16 students (660 sq.ft., 41 sq.ft/st.)
2nd. min. 23 students (715 sq.ft., 31 sq.ft./st.)
max. 35 students (670 sq.ft., 19 sq.ft./st.)
max. 35 students (760 sq.ft., 21.5 sq.ft./st.)

Area/st.: min. 19 sq.ft. (670 sq.ft., 35 students)
2nd. min. 21.5 sq.ft.(760 sq.ft., 35 students)
max. 41 sq.ft. (660 sq.ft., 16 students)
2nd. max. 34.5 sq.ft.(830 sq.ft., 24 students)

It is worthwhile to remark that larger CRs are more populated than smaller CRs, and conversely, larger numbers are housed in CRs with larger areas.

Moreover, 1.5 times more area is allotted to each student in the CRs with smallest enrollments (and smaller areas), than in the CRs with largest enrollments (and larger areas).

Finally, the CRs which provide the largest area per student have larger overall areas and smaller enrollments, than the CRs with the smallest area per student.

1.1.1. STUDENTS

1. 'Would you like your classroom bigger in area, as it is, or smaller in area?'

   (See App.1, Sec.1.1.1.)

On the whole, a little more than half of the students replying to this question have asked for larger area, and only two percent have wanted smaller area. There is no doubt that the lack of space in the CRs is well felt and recognized by the majority of the students. However, a paradox emerges: it is not the students in the smallest CRs who are the least satisfied, nor those of the largest rooms who are the most satisfied with their CR area.

2. Effects of actual area, No. of students and area/student

   (See App.3, Sec.1.1.1.)

It is found that the max. proportion of students

- replying 'bigger' (92%) occurs in a 700 sq.ft.CR,
  of 27 students,
  with 26 sq.ft./st.,
- replying 'as it is' (92%) occurs in a 670 sq.ft.CR,
  of 27 students,
  with 25 sq.ft/st.,

(if we exclude this last school, it being the only one where Vth graders filled the questionnaires),

- replying 'as it is' (88%) occurs in a 700 sq.ft.CR,
  of 24 students,
  with 29 sq.ft./st.,
- replying 'smaller' (13%) occurs in a 820 sq.ft.CR,
  of 24 students,
  with 34 sq.ft./st.

However, in a 780 sq.ft. CR with the largest per capita area (41 sq.ft.), 44% of its occupants ask for larger area.

* This means that when evaluating their CR area the children are under many influences other than those of the actual areas and numbers.

It is also found that:

- Children in the CRs with the smallest areas are more satisfied with the area than those in the largest rooms, & conversely, the most satisfied children are found in the smaller rooms.

- Similarly, children in CRs with smaller enrollments show more acceptance of their CR area than those in more populated CRs, and conversely, the most satisfied students are part of smaller enrollments.

- However, when we consider the area allotted to each student, satisfaction is higher in CRs with largest rather than smallest area per student, & conversely, highest satisfactions are noted in CRs with larger per capita areas. This can explain why the smaller CRs, in which each student shares a larger area, are more favored than the larger CRs.

3. Grouping: No. of students per classroom

(See App. 4, Sec.1.& Sec. 2.1.1, No.1.)

For the sake of comparison, schools are divided into categories according to the characteristics of their CRs.
The first of these characteristics is the 'No. of students' in the CR. Three categories are considered: CR with 16-26 students, CRs with 27-30 students & CRs with 31-35 students.

The other characteristics, 'class type' & 'seating arrangement', are dealt with later.

As anticipated, and already shown, students in less populated CRs are more satisfied with the area, than their counterparts in more populated CRs.

4. Effect of CR shape

(See App.1, Sec. 1.0, No.4)

Of the 32 CRs visited, there are:
- 5 square in plan,
- 8 nearly square (5 having the windows on the longer side,
  3 on the shorter),
- 12 long-rectangular (windows on the long side),
- 4 wide-rectangular (windows on the short side),
- 3 open areas.

When comparing the student responses between these different types, we come to realize that the appreciation of the area is also affected by the lengths of the children's sight lines.

Thus, in exactly square rooms where the distance between the children and the main chalkboard is less than in rectangular rooms, 52% approve of the area (cf.44% average); in square & nearly square rooms taken together, this figure becomes 48%, in long-rect. rooms 44% and in wide-rect.rooms, where the sight lines are shorter than usual, only 32%.

To sustain this last point, consider the 4 most densely populated CRs: in the 2 rooms with short side chalkboards 48% & 23% of the children are satisfied with the area, while in the 2 rooms with long side chalkboards only 7% & 9% are satisfied.

5. Effect of seating arrangements

There seems to be no difference in the area appreciation of the children, whether they sit alone, in pairs (2 desks side by side), or in groups *.

6. Grouping: Seating Arrangement

(See App.4, Sec. 2.1.2, No.1.)

Three seating patterns are observed:

- Conventional Row Seating, with one, two or more desks side by side,
- Semi-conventional Tiers Seating, with children forming a U or facing each other,
- Active Seating, with groups of one, two, four or more desks.

No significant differences are found between the classrooms of different seating patterns with respect to the appreciation of the area. We can note, however, that children demand larger area more often in the CRs with conventional seating arrangement rather than in CRs with other seating patterns.

7. Responses to 'Seating Arrangement'

When asked what they like most in their CRs, children have chosen, out of 10 items, 'Seating Arrangement' & 'View from the windows' more often than anything else. Interestingly, the 'Seating arrangement' is also one of the 3 most disliked elements in the CRs, along with the 'walls & the 'desks'.

8. Responses to 'Sitting Place'

(See App.1, Sec.1.1.2.)

Students indicate that they are dispersed almost equally over

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* It would be interesting to study the effects of different desk widths. However, this aspect is not considered in the present thesis.

the whole surface area of the CR, sitting 'near the windows' 'near the blackboards' & 'neither near the windows, nor near the blackboards', as well as 'at the front', 'in the middle' & 'at the back' of the CR. However, the 'neither... nor' & the 'in the middle' categories receive slightly fewer replies, & this does not surprise us, since these are more ambiguous categories than the others.

If we consider now the places the children would prefer to sit, we find that the position 'near the windows' is chosen by almost half the students, the rest equally opting for 'near the blackboards' & for 'neither ,.. nor'. Moreover, the middle of the classroom is the least preferred place.

When comparing the actual sitting & the preferred sitting positions, we find the highest satisfactions (i.e. coincidence of actual & preferred places) 'near the windows'. Also, those sitting 'in the middle' show the least satisfactions.

9. Effect of Responses to 'Sitting Place' on Responses to 'Area'

The average satisfactions with the 'sitting place' do not seem to have any effect on the children's satisfaction with the 'area' of their CR *.

10. Effect of Responses to 'Seating Arrangement' on Responses to 'Sitting Place' & on Responses to 'Area'

In the 9 CRs where students mention 'Seating arrangement' as an element they like most, 49.5% of them are satisfied with their 'sitting place' (cf.46.5% average), while in the 7 CRs where 'Seating arrangement' is most disliked, 42.75% of the students are satisfied with their place. Conversely, however, no relationship is apparent.

Also, there appears to be no direct correspondance between responses to 'seating arrangement' & responses to 'area'.

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* Another point worth examining is the study of the children's responses to the 'environmental factors' & to the 'attitudes', with respect to their different sitting places.

11. Grouping: Class Type

(See App. 4, Sec.2.1.3, No.1.)

In our sample most of the classrooms are totally enclosed, i.e. have fixed partitions, only 3 have operable partitions which carry the blackboard panels, & 3 others are considered of the no-partition type, although one of them has accordeon-type partitions on 2 sides & is completely open only on one side.

Actually, the operable partitions are not opened very often, and in the CR with the accordeon-type partitions classes are conducted in a very traditional way. The possibilities of the open plan are not utilized, and consequently the teachers are hindered.

Highest satisfaction with the area occur in the CRs with 'operable partitions', the lowest occur in CRs with 'fixed partitions'.

Moreover, of the 8 CRs with highest acceptance of the area, 3 have either 'operable' or 'no partitions' at all, while in the 8 with lowest acceptance, only one has moving partitions.

We can tentatively conclude that as walls become more flexible, children feel less confined in their CRs. But further research is necessary in this direction since only 6 of the 32 classrooms of this study have non-fixed partitions, & that is not enough to enable us to make clear-cut statements.

12. Effect of Windows

(See App.1, Sec.1.0, No.5.)

Wooden windows are found in half the CRs, and metal windows in the other half.

In 16 CRs the windows are double hung, either separately, or combined with fixed or other parts. The rest of the windows are horizontally hinged & inward-swinging, sliding, etc..

In 9 CRs the windows do not occupy a whole wall, & in most of them extend from floor to ceiling.

In 9 CRs no provision is made to protect the interior against the sun, or to darken for audio-visual projections.

I have seen curtains in 14 CRs, venetian blinds in 7, shades in 2 & interior shutters in one CR.

Would the windows have any effect on the appreciation of the area?

In CRs of comparatively smaller fenestration surfaces, children would be expected to show less satisfaction with the area, since they would feel more confined.

The opposite is observed, however. In these CRs 56% are satisfied with the area, as opposed to 39% in the other CRs.

However, in CRs where students sit facing the opposite direction of the windows, satisfaction drops to 37% *.

13. Effect of Responses to 'View'

The 'View from the windows' is the element of the CR most often mentioned as 'most liked' (25%). No relationship seems to exist between these responses & responses to 'Area'**.

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* Another aspect which is worth studying more thoroughly.

** Another point to investigate.

1.1.2. TEACHERS

1. 'Do you consider the area of your CR) adequate,
2. 'Do you consider the No.of students in your CR) barely adequate, or inadequate?'

(See App.1, Sec.1.2.1. & 1.2.2.)

On the whole, almost half of the teachers consider the area of their CRs 'adequate' and almost two-thirds are satisfied with the No. of students they have in their CRs.

3. Mutual effects of responses to 'Area' & responses to 'Number' (See App.3, Sec.2.1.)

If we look at the extreme ends, we see that the two responses do not exactly match. Thus, the school with maximum satisfaction with the area, & the school with minimum satisfaction, do not show maximum & minimum acceptances, respectively, of the no. of students.

These extremes, however, should not upset the fact that generally teachers most satisfied with the area are also highly satisfied with the number of students, the same holding true for the least satisfactions. And vice versa.

4. Effect of Area

The actual areas of the CRs seem not to influence the teachers' ratings of 'Area' & 'Number of Students'.

5. Comments on 'Area' and on 'Number of Students'

A dissatisfaction with the present norms for CR areas and enrollments is common to nearly all schools visited.

Thus, only 7 principals expressed satisfaction ("good size"), 2 mentioned that the areas were enough for 30 but not more students, & 3 stated that the CRs were of "standard size and functional".

The rest found their CRs too small, 3 principals giving the number 25 as the limit for enrollments per CR; one principal indicated that the CRs would be too small if, as allowed by Quebec norms, 35 students were housed in them. Also, the head of one of the open plan schools complained that the big general teaching area was not sufficient for 180 students, while some mentioned that it would be impossible to regroup the children for various activities.

As for the teachers, in all the schools the majority complained of the lack of space. More space was required for individual work, for group activities & for display of student work.

In 16 schools "25 students" was mentioned as "ideal", "good", or "enough" for each CR, (30-35 being considered inconvenient), & in the other 16 schools this limit was 29-30 (in these schools teachers complained of very high enrollments, such as 37-39). In two of the schools there were teachers demanding only 15-20 students for the areas provided.

One should not be surprised vis-à-vis these variations in the opinions because, apart from the very subjective attributes of these comments, the fact that younger children occupy less space would have an effect on teacher opinions.*

When asked what would they like to change in their CRs, teachers in 27 schools required larger surface areas, in 3 schools "fewer children" was also mentioned, while in 2 schools a demand for "work areas" was made. In 3 other schools, it was the shape of the CR which was required to change.

6. Responses to 'Storage Space'

(See App.1, Sec.1.2.3.)

Teachers are even more aware of the lack of storage space than the insufficiency of the CR area.

Only 42% of them consider the storage space 'adequate', and 32% consider it 'inadequate'.

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* While it is obvious that the size of the children's bodies, & hence their spatial requirements change from one age to another, nothing indicates that these changes are considered in the planning of the CRs all of which have the same dimensious throughout any one school. Here is another aspect to study.

7. Mutual Effects of Responses to 'Storage' & Responses to 'Area'

(See App.3 , Sec.2.1.)

There is a very close link between teachers'responses to the adequacy of the CR areas & to the adequacy of the storage areas within the CRs.

In the schools with highest satisfaction with 'storage', teachers are also highly satisfied with the CR area, & on the contrary, when they are least satisfied with the storage, they also find the area least 'adequate'. And vice versa.

8. Comments on 'Storage'

As in the ratings, in their comments teachers are aware of the lack of storage spaces.

During the interviews, only 3 of the principals mentioned the need for more storage space in the CRs, but this need was repeated in 22 schools by the teachers who asked for shelves, cupboards, closets & lockers in addition to what they already had, or to compensate for the lack of these spaces. The need for storage space for large items, such as paper for art work & materials for models, etc, was mentioned in 3 schools. In 3 other schools it was said that no storage space existed, while in one school it was considered impossible to use the spaces provided behind the chalkboards, and in only 2 schools teachers approved the storage space.

When asked what would they like to change in the CR environment, the teachers of 24 schools required more storage space *.

9. Effect of CR shape

From the ratings of the adequacy of the CR areas, it was not possible to find differences due to various shapes **.

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* It would be very interesting to study the storage requirements of the CRs, considering the different materials to be stored & the different ways of doing it.

** This is another theme which needs thorough research. What are,if any, the best room plans to allow the application of the new educational methods?

10. Grouping : Class Type

(See App.4, Sec.2.2.3, No.1.)

Teachers in the CRs which have operable partitions are the most satisfied with the area of their CRs, while those in the open areas are the least satisfied.

As to the number of students in the CRs, teachers in the CRs with operable partitions show only slightly more satisfaction with it than the teachers in the other types.

It would be worthwhile to mention here that, whereas the teachers in the CRs without partitions obviously are not very enthusiastic with their modern environments, the need to pull down existing partitions between CRs has been expressed by more than one principal.

Thus, 14 principals stated that in order to adapt the school building to the emerging methods in teaching, partitions could (or should) be pulled down; 7 principals regretted that they could not do so because of the high cost or the technical difficulties (load bearing walls); 2 principals required the elimination of some but not all walls ("No Greendale, please!"). In two schools with operable partitions it was mentioned that these were difficult to open, & in one school there had been the provision to move the partitions between CRs in groups of three.

11. Responses to 'Windows'

(See App.1, Sec.1.2.4.)

Three quarters of all teachers regard the windows of their CRs as being 'adequate'.

When we consider the schools with comparatively less window surfaces, we find no reduction in teachers' satisfactions with the windows.

12. Mutual Effects of Responses to 'Windows' & Responses to 'Area'

Is there any relationship between the satisfactions with the CR area & with the windows?

We find that 42.5% of the teachers in the 9 CRs with less window surfaces rate the area of their CRs 'adequate' (cf. 51% average). Does this mean that when there are fewer windows in a CR, its area is felt to be smaller?

Now, in the schools with maximum satisfaction with the CR area, there are slightly higher ratings for the adequacy of the windows, than in the CRs with minimum satisfaction with the area.

On the other hand, in the schools with maximum 'adequate' responses for the windows, as well as with minimum 'adequate' responses, there is no average significant difference in the ratings of the area.

Therefore no direct relationship can be seen between these two factors.

13. Comments on 'Windows'

In 12 schools teachers mention windows as elements requiring change, while in 4 schools the need for curtains or venetian blinds is indicated.

Only in one case is there a favorable comment on the windows ("good to have semi-panoramic windows"). Out of the defects mentioned, we can note the following:

- the size, the need for more or larger windows, in 6 schools, the need for less, in 1 school;
- the difficulty to open, "awkward to open","very high", "stuck in winter", "opening into the CR"(when windows are of the inward-swinging type), in 8 schools;
- the lack of wire mesh screens, in 2 schools
- the improper ventilation, either too little or too much air being admitted (when windows are sliding or inward-swinging), in 6 schools.
- the window-glare, in 3 schools.
- the overheating (by radiation), in 2 schools.

1.1.3. STUDENTS AND TEACHERS COMPARED

Although in each school the group of students who replied to my questionnaire belonged to the same classroom, while the teachers were dispersed over the whole school, a comparison between their responses is interesting.

A smaller proportion of principals than of teachers expresses its dissatisfaction with the area, & a smaller proportion of teachers than of students do the same.

Is this because students more than anybody else pass their time in the confinement of the enclosed spaces which are the CRs?

Is it haphazard or not, I cannot say, but the school with highest student satisfaction with the area is where the highest teacher satisfaction prevails too. In other schools, however, results do not correspond, since this satisfaction depends, among other things, upon the number of children per CR, which is a highly varying factor.

Teachers in the CRs with operable partitions, just like the students, are the most satisfied with the area.

The students, however, are almost equally satisfied in the CRs without partitions, while the teachers are considerably less happy in them.

Are the new environments more appealing to the children than to the adults? Would the latter require a longer period of time before they accept the open plans?

1.2. THE THERMAL ENVIRONMENT

1. TEMPERATURE)
2. RELATIVE HUMIDITY) (See App. 1, Sec.2.0.)
3. EFFECTIVE TEMPERATURE)

The schools were visited during January & February, & the dry bulb & wet bulb recorded sometime before noon.

The average DB Temperature in all 32 schools is 73F,ranging from a high of 80 to a low of 67.

The average Relative Humidity was calculated at 54.5% (max. 65, min.30).

The Effective Temperature, resulting from the Temperature & the Rel. Humidity, was averaged at 69F, with a max.of 74 & a min. of 64.

4. HEATING SYSTEMS
(See App.1 , Sec.2.0,No.4.)

- 17 CRs are heated by hot water heaters,(15 convectors, 2 radiators);8 of these have also an exhaust air grille, one has a ventilator, while 8 others have no provision for mech. ventilation.
- 10 CRs are heated by hot water heaters with forced air systems, 4 of them having also an exhaust grille.
- 4 Crs are heated by electricity with forced air systems, (unit ventilators).
- 1 CR is heated by electricity, & ventilation is achieved through opaque sashes above the windows & on the opposite wall.

1.2.1. STUDENTS

1. 'Would you like to have your CR warmer, as it is, or cooler?'

(See App.1, Sec. 2.1.1.)

About two thirds of all students are satisfied with the thermal atmosphere of their CRs. The rest ask for warmer or cooler temperatures, almost in equal numbers.

The max. satisfaction (96% of students) occured in a CR where the Eff. Temp. was 70F, the heating system used hot water, & there was an exhaust grille.

The min. satisfaction (38%) was found in a CR where the Eff. Temp. read 68F & the system used hot water with forced air.

2. Effect of Effective Temperature

Is there any relationship between Effective Temp. & the student responses to 'thermal atmosphere'?

In the 10 CRs with highest Eff. Temp. (70F & above) 73% of students accept the temp.'as it is', while in the 9 CRs with lowest Eff. Temp. (67F & below), 67.5% of the students are satisfied.

Now, as the winter comfort zone varies between 65-70 F of Eff. Temp., & most schools fall in these limits, we can hardly conclude that the slight difference found above is due to Eff. Temp. variations.

On the other hand, in the 8 CRs with max. satisfaction with the therm. atm. (81% & more), the Eff. Temp. is on the average 69.5 F, while in the 8 CRs with min.satisfaction (52% & less), it is 68.5F.

It is difficult to establish from our data a holding relationship between Eff. Temp. & student satisfaction with the temp.

3. Effect of Heating Systems

Now, looking into the differences of student responses with respect to the different heating systems, we find that:

- Highest satisfactions (72-74% of students) occur in CRs with electric heater with forced air ventilators, & in CRs with hot water heaters with the provision of mechanical ventilation.

- Satisfactions decrease in CRs with hot water heaters with forced air ventilators (64,5%), & reach their min. in CRs with hot water heaters without ventilation (61%)

- Highest demands for warmer temperatures occur in CRs with hot water heaters & forced air vent. (28%), while highest demands for cooler temperatures are seen in CRs with hot water heaters without mechanical vent. (27.5%)

4. Effect of Area

(See App.3, Sec.1.2.)

An inverse relationship is established between CR area & student satisfaction with the thermal atmosphere. Thus, less children are satisfied in the largest CRs than in the smalleat CRs, & conversely, the most satisfied children are housed in smaller rather than larger CRs.

5. Effect of No. of Students

(See App.3, Sec.1.2.)

Similarly, when the children are crowded in the CRs they find the temperatures less satisfactory than when they are not crowded. Conversely, those most contented with the thermal atmosphere are found in CRs with smaller enrollments, than those who are least contented.

6. Effect of Area/Student (See App.3, Sec.1.2.)

The above relationships are weakened in this case, since the area per student increases when the total CR area is increased (i.e. less satisfaction with the therm.atmosphere), or when the no. of students is decreased (i.e. more satisfaction with the therm. atm.).

However, slight differences show a direct relationship between area per student and responses to temperature.

7. Grouping : No. of students per classroom

(See App. 4 , Sec.2.1.1, No.2.)

Less populated CRs show significnatly higher satisfactions with the therm. atmosphere, than more populated CRs.

8. Mutual Effects of Responses to 'Thermal Atmosphere' & responses to 'Area'

(See App.3 , Sec.1.2.)

When students are satisfied with the thermal atmosphere of their CRs, they are also satisfied with the areas, & vice versa. However the differences are not so big as to suggest holding relationships.

9. Effect of CR shape

No significant relationship is established between CR shape & student responses to thermal atmosphere.

10. Effect of Responses to 'Sitting Place'

No significant differences are calulated, for satisfactions with 'Sitting place', between CRs with highest & CRs with lowest acceptances of the thermal atmosphere.

Nor any relationship has been found in the opposite direction.

11. Grouping : Seating Arrangement

(See App.4 , Sec.2.1.2, No.2.)

The CRs with active group seating patterns show a higher satisfaction with the thermal atmosphere than the CRs with conventional or semi-conventional seating arrangements.

Consequently, there is much less demand for warmer temperature in the active CRs than in the others, and less demand for warmer than for cooler temperature, while in the conventional & semi-conventional types the opposite is true. Is it, because the children have more possibilities to move around, they feel warmer in active CRs?

12. Grouping : Class Type

(See App.4 , Sec.2.1.3, No.2)

Almost at a statistically significant level, CRs without partitions show highest acceptance of the thermal atmosphere, while those with operable partitions show the lowest acceptance.

This difference, however, may be due to reasons other than the characteristics of the partitions.

13. Effect of Windows

No significant difference is apparent between CRs with larger window areas & CRs with smaller window areas with respect to satisfaction with the thermal atmosphere.

1.2.2. TEACHERS

1. 'Do you consider the thermal atmosphere of your CR	)	adequate,
	)	barely adequate
2. 'Do you consider the ventilation in your CR	)	or inadequate?'

(See App.1, Sec.2.2.1.& 2.2.2.)

About two thirds of the teachers find the thermal atmosphere of their CRs 'adequate', & a little less find the ventilation 'adequate'.

The 'adequate' responses to thermal atmosphere range from 100% down to 18%, with a mean of 62, & to ventilation from 100% to 0%, with a mean of 58.

3. Mutual Effects of Responses to 'thermal atmosphere' & Responses to 'ventilation' (See App.3, Sec.2.2.)

There is a strong direct correlation between the two responses : higher satisfactions with the thermal atmosphere accompany the highest satisfactions with the ventilation & vice-versa.

4. Effect of Heating Systems

The different heating systems are a major factor in the teachers' appreciations of the thermal environment. Thus, the lowest satisfactions occur in schools using hot water systems without mechanical ventilation or with forced air ventilation, & the highest satisfactions occur in the schools with hot water systems with mechanical ventilation. Systems using electricity show high satisfactions with the ventilation but lower with the thermal atmosphere.

5. Comments on 'Thermal Atmosphere' & 'Ventilation'

When asked what would they like to change in their CRs, the teachers of 6 schools have mentioned the heating, & of 9 schools the vent. system.

It is interesting to note that although on the whole a big proportion of teachers are satisfied with both

therm. atm. & vent., nevertheless in 19 schools they complain of inconsistency of the temp., in 7 they state that the CRs are too hot, specially on sunny days & in warm weather, & in 5 they complain of the cold. Only in one school the thermal atm. is qualified as "warm & pleasant", & in another it is mentioned that independently controlled thermostats are found in the CRs.
These dissatisfactions occur in all schools regardless of the heating systems.

As to the complaints about ventilation, in 10 schools teachers stated that it is nil (although only 4 of the CRs have no vent. system except the windows.
Other complaints include drafts (when windows are opened for vent.), irregularity,dust coming out of the grilles, etc..

6. Effect of Area

(See App.3, Sec.2.2)

Are the responses to 'thermal atmosphere' & to 'ventilation' influenced by the spatial characteristics of the CRs?

Teachers are more satisfied with both aspects of the thermal environment in the largest rather than in the smallest classrooms.

The converse is not true, however.

7. Mutual Effects of Responses to 'Thermal Atmosphere' and Responses to 'Area'

No consistent trends found out.

8. Mutual Effects of Responses to 'Ventilation' and Responses to 'Area'

No relationship is discerned.

9. Mutual Effects of Responses to 'Thermal Atmosphere' & Responses to 'No. of Students'

(See App.3, Sec.2.2)

When teachers are most satisfied with the thermal atmosphere they give more 'adequate' answers to the 'no of students' than when they are least satisfied. Conversely, when they find the no.of students most adequate they show higher satisfaction with the thermal atm., than when they find the no.of students least adequate. However, the differences are not so great as to suggest a strong relationship.

10. Mutual Effects of Responses to 'Ventilation' & Responses to 'No. of Students'

(See App.3 , Sec.2.2.)

A very weak relationship is observed

11. Effect of CR Shape

No clear relationship seems to emerge from the comparison of the teachers' ratings of the thermal environment with respect to the CR shape.

12. Grouping : Class Type

(See App. 4 , Sec.2.2.3,No.2.)

In CRs with fixed partitions & in those without partitions more teachers find the thermal atm. 'adequate', than in CRs with operable partitions. A similar but less significant trend is discerned vis-à-vis ventilation.

13. Effect of Windows

No differences in CRs with larger & in CRs with smaller window surfaces are found.

14. Mutual Effects of Responses to 'Window' & Responses to the 'Thermal Environment'

(See App.3 , Sec.2.2.)

Teacher opinions about the thermal atm. are not influenced by their opinions about the windows, & vice versa. However, & as anticipated, a slight direct relationship is found between responses to 'windows' & responses to 'ventilation'.

1.2.3. STUDENTS AND TEACHERS COMPARED

On the whole, students and teachers are almost equally satisfied with the thermal atmosphere of their CRs, however they differ from each other in different schools, & neither the max. nor the min. satisfactions of the students correspond with those of the teachers. And vice versa.

1.3. THE LUMINOUS ENVIRONMENT

1. LIGHT READINGS ON THE DESKS)
2. LIGHT READINGS ON THE CHALKBOARDS) (See App.1, Sec.3.0, No.1. & No.2.)

Enormous inequalities exist in the intensity of light among different CRs.

Thus, foot-candle readings on the desks range from a max. of 275 to a min. of 40 (average 109), & on the chalkboards from 230 to 15 (average 62.5).

Usually the front chalkboards have two deficiencies: first, there is a high intensity on the left side due to the windows; this causes glare; secondly, they do not receive uniform light from the fixtures, since in most cases these are perpendicular to the boards. The side chalkboards, which are parallel to both the windows & the light fixtures do not have these disadvantages.

In the 3 CRs where there is a row of lights above the front chalkboards, the average reading is 92.5 ft.candles, considerably higher than the rest.

Needless to say, high intensities on the desks correspond to high intensities on the chalkboards.

3. LIGHTING SYSTEMS

(See App.1, Sec.3.0, No.3.)

In this sample only 4 out 32 CRs have incandescent lighting, giving an average reading of 84 ft-candles on desks & 60 ft-candles on chalkboards (remember that sky conditions have a very great effect on these results, as will be seen later).

All the other CRs have fluorescent luminaires, either fixed directly to the ceiling or hung at about one foot below it.

One of these has no fixture (shade) at all, & another one, again without a shade, is set in the ceiling.

In 13 CRs the luminaires have acrylic fixtures (ave.133 ft-candles on desks, 80 on boards), & in 13 other CRs they have louvred fixtures (ave.91.5 on desks, 48 on boards).

4. Effect of Sky Conditions

(See App.1, Sec.3.0, No.4.)

In the 13 CRs which were visited on sunny days, the readings on the desks averaged to 100, & on the boards to 69.5 ft-candles. In the 5 CRs visited on hazy-sun days, the readings were 165 & 92, while the 14 CRs which were visited on cloudy days gave an average readings of 97 & 45.5 ft-candles.

The fact that sunny days produced lower readings than hazy days may be explained by the fact that the shades or the curtains were nearly always drawn to keep out the sun.

We can state that it would be unfair to infer general conclusions from these results because the type of the luminaire, the amount of window surfaces & their being shaded or not, as well as the sky conditions, not mentioning the orientation of the CR itself, are interacting variables & were not controlled in this study. The only fact which can be ascertained is that children can adapt themselves to work in luminous environments completely different from each other.

5. The Effect of Windows

In the 9 CRs with less window surfaces, the average reading on the desks is 90.5 & on the chalkboards it is 44.5 ft-candles, i.e. less than the total averages.

1.3.1. STUDENTS

1. 'Would you like the light on your desk, on the chalkboard, & in the CR to be more, as it is, or less?'

   (See App.1, Sec.3.1)

About half the number of all the students find the lights satisfactory, about one fifth of them demand more light, one tenth ask for less light, & the remaining one fifth abstain.

2. Totals of 'as it is' Responses in All 3 Cases

   (See App.1 , Sec.3.1.4.)

28% of the students are satisfied at the same time with the lights on the desks, on the chalkboards & in the CRs.

3. Effect of Light Readings

   (See App.3 , Sec.1.3.)

As greatly anticipated, there are direct relationships between student responses & the measured light readings.

Thus, in the CRs of highest intensities on the desks children are more satisfied with the light on the desks & the light in the CR than in the CRs of lowest intensities. Conversely, the most satisfied students are found in CRs with higher intensities. The same is true in the case of the lights on the chalkboards.

However, these relationships do not stand up very strongly when statistical mathematics are introduced, since, as we have seen, children seem to adapt to greatly varying intensities.

4. Effect of Lighting Systems

There seems to be no significant difference in their responses to the'light in the CR' among the 3 categories (fluorescent luminaires with acrylic shades, fl.lum.with louvred shades & incandescent lum.).
However, in the general satisfaction (of the light, at the same time, on desks, on the boards & in the CR), acrylic shades come first (31.75% 'as it is'), while louvred shades & incandescent luminaires rate 23.75% & 20.25% respectively.

5. Effect of Windows

Do smaller window surfaces affect student responses to light?

Contrary to the expected results, the CRs with less window surfaces have higher ratings of satisfaction with the lights.

6. Effect of Area, Number of Students & Area per student.

Neither the areas of the CRs, nor the numbers of students per CR (hence nor the area per student) cause significant changes in the appreciation of the lighting. And vice versa.

7. Grouping: No. of Students per CR

(See App.4 , Sec.2.1.1,No.3.)

Similarly, no significant differences are computed when the 3 enrollment categories are considered. However, students in the less populated CRs show a somewhat higher satisfaction with the lights on their desks & on their chalkboards.

8. Mutual Effects of Responses to 'Area' & Responses to 'Lights'

(See App.3, Sec.1.3.)

There appears to be, however, a direct relationship between students' reactions to area & to lighting.

Thus, when children find the lights most satisfactory on their desks, on the chalkboards & in the CR, they are also more satisfied with the area, & when they find the lights least satisfactory they are less satisfied with the area.

Conversely, the maximum & minimum satisfactions with the area accompany higher & lower acceptance of the lights respectively.

9. Effect of CR Shape

The shape of the CR seems to cause no differences in the appreciation of the lighting.

10. Mutual Effects of Responses to 'Sitting Place' & Responses to 'Lights'

Contrary to expectations, satisfactions with sitting place do not reflect satisfactions with the lights on the desks & on the chalkboards. And vice versa.

11. Grouping : Seating Arrangement

(See App.4, Sec.2.1.2, No.3)

No statistically significant differences are computed when the different seating patterns are considered. However, somewhat higher ratings occur in active CRs.

12. Grouping : Class Type

(See App.4, Sec. 2.1.3, No.3.)

Again, no differences among the 3 categories of CRs are observed.

13. Mutual Effects of Responses to 'Thermal Atmosphere' & Responses to 'Lights'

(See App.3, Sec.1.3.)

Do students' responses to the thermal environment influence their responses to the luminous environment?

No significant differences are found between the CRs with max.satisfaction with the therm. atm., & those with min. satisfactions, with respect to the appreciation of the lighting.

Similarly, no differences are observed in the appreciation of the thermal atmosphere, in CRs of highest & lowest satisfactions with the lights.

Only in one case, i.e. that of max. & min. satisfactions with the 'lights in the CR', a corresponding rise & fall is noticed in the responses to the thermal atmosphere.

14. Colours

The colours which the children most like to have in their CRs are, in rank order:

Light blue	(chosen by	34%	of the students)
White	(" "	30%	" " ")
Light green	(" "	24%	" " ")
Medium blue	(" "	23%	" " ")
Light yellow	(" "	16%	" " ")

At the same time, the colours most disliked are:

Dark red	(chosen by	45%	of the students)
Dark purple	(" "	43%	" " ")
Dark grey	(" "	26%	" " ")
Dark Orange	(" "	22%	" " ")
Medium grey	(" "	15%	" " ")
Light yellow	(" "	15%	" " ")

It is interesting to note that light yellow is equally liked & disliked by the students.

Comparing the colours liked with the actual colours in the CRs, we observe that:

- Light blue (including light turquoise) occur only on the walls of 4 CRs;
- White is the one colour which is found nearly in every CR: in 1 CR on the floor, in 10 CRs on the walls & in 21 CRs on the ceiling;
- Light green (including light yellow green) occur in 1 CR on the floor, & in 6 CRs on the walls;
- Medium blue is found nowhere, except on some cupboards;
- Light yellow (including cream) occur in 12 CRs on the walls & in 2 on the ceiling.

15. Effect of Colours on Responses to 'Area'

Is there a relationship between colours & the appreciation of the area?

Considering only the wall colours, as these are the ones the children look at mostly, there seems to be no clear relationship between colour and area appreciation.

The CRs with highest satisfactions have light yellow, light green, light yellow green, & light blue on their walls, while with the lowest satisfactions have yellow, light yellow green too. But grey, green & turquoise occur more in low satisfaction CRs. Also, in all the classrooms there are no dark colours, therefore a comparison between light & dark is impossible.

16. Effect of Colours on Responses to 'Thermal Atmosphere'

Similarly, colours seem not to have influenced the appreciation of the thermal atmosphere, as almost the same colours exist in the CRs with the highest & in the CRs with the lowest acceptance of the temperature.

17. Effect of Colours on Responses to 'Lights'

Neither can any influence on the responses to the 'lights' be attributed to the colours of the CR.

However, a slightly higher satisfaction is noticed in the CRs having green rather than black chalkboards*.

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* Another vast field for interesting investigations: how colours affect our environmental perceptions.

1.3.2. TEACHERS

1. 'Do you consider the lighting in your classroom adequate, barely adequate or inadequate?'

(See App. 1, Sec.3.2.1.)

Almost all teachers find the lighting to be adequate; the teachers of 11 schools express 100% satisfaction, the lowest acceptance being 62%.

2. Comments on 'Lighting'

Only in 7 schools do teachers mention that lighting requires improvement, & in 2 others they ask for lighting over the blackboard. In one school which has considerably smaller windows, more natural light is prescribed.

In three schools teachers state that they have a good, bright lighting, (in one sch. specifying that there are no glares). In 3 other schools the artificial light is considered adequate (even too much), but natural light poor.

In 4 schools more brightness is required, & in 2 the fluorescent lights are condemned as being damaging to sight. In 2 more schools lighting is not sufficient on the chalkboard & in 3 glare is a problem.

3. Effect of Lighting Systems

From my data no differentiation is discerned between teachers' responses in schools with various lighting systems.

4. Effect of Windows

Teachers' ratings of lighting do not vary from CRs with wall to wall window surfaces to CRs with smaller fenestration surfaces.

5. Mutual Effects of Responses to 'Windows' & Responses to 'Lighting'

(See App.3, Sec.2.3.)

There seems to be a direct relationship between the two responses. Teachers are more satisfied with the lighting when they find the windows most adequate, and vice versa.

6. Effect of Area

No significant changes in light ratings occur when we consider the actual areas of the CRs.

7. Mutual Effects of Responses to 'Area & Responses to 'Lighting'

8. Mutual Effects of Responses to 'No.of Students' & Responses to 'Lighting'

Nor any significant changes are noted due to the responses to 'Area' or the responses to 'Number of students', although CRs with high ratings for both have a somewhat higher ratings for lighting too, than CRs with low ratings for 'Area' & 'No. of students'.

9. Effect of CR Shape

Long rectangular rooms have 80.5% 'adequate' average ratings for 'Lighting', while all the other CRs give 92% satisfaction.

10. Grouping : Class Type

(See App.4 , Sec.2.2.3, No.3.)

Although CRs without partitions show a slightly higher satisfaction with lighting, no statistical significance results.

11. Mutual Effects of Responses to 'Thermal Atmosphere' & Responses to 'Lighting'

No significant relationship is seen between the two.

12. Responses to 'Colours'

(See App.1 , Sec.3.2.2.)

The vast majority of teachers are satisfied with the colours of their CRs.

13. Comments on 'Colours'

The colours of the most liked & least liked CRs will be described in the last part of this study. Here will be given only the comments of the teachers & no attempt is made to describe the colours since these vary from school to school and often from CR to CR in each school.

- In their answers to 'What would you like to change in your CR', teachers of 11 schools mention 'colours'.

- Only in six schools do teachers give positive comments about the colours, describing them as 'tranquilizing', 'very good', 'excellent', 'magnificent' & 'warm'.

- In 14 schools teachers criticise the colours of their CR in general, or of some parts of it.
Colours are described as being 'neutral', gruesome', 'unimaginative', 'too uniform', 'too drab', 'too pale', 'wornt out', & 'grey, grey, grey'.

The demand is for brighter, gayer colours, but there is a certain criticism about yellow, specially on the floor as it shows dirt very quickly.

14. Mutual Effects of Responses to 'Colour' & Responses to 'Area'

No effects are observed.

15. Mutual Effects of Responses to 'Colours' & Responses to 'Thermal Atmosphere'

No effects are observed.

16. Mutual Effects of Responses to 'Colours' & Responses to 'Lighting'

Similarly, no relationship is seen.

1.3.3. STUDENTS AND TEACHERS COMPARED

Students are more critical than their teachers in judging the luminous environment of their CRs. While it is true that all the students of a school belong to the same CR but every teacher to a different one, the lighting systems in a school are nearly the same in every CR, so it is fair to make comparisons.

Students are satisfied with the light on their desks by 49%, on their chalkboards by 44%, & in the CR by 61%, while teachers show 89% satisfaction with 'lighting' in general.

High and low ratings by students usually accompany high & low ratings by teachers, but the reverse is not so clearly visible.

Finally, teachers & students give highest ratings for lighting in the CRs without partitions, & the lowest in the CRs with operable partitions, but these results do not show statistical significance.

1.4. THE AURAL ENVIRONMENT

1. NOISES HEARD IN THE CLASSROOM

The usual noise sources inside the classrooms are movement of chairs, scraping of feet, falling of small articles, closing of desk tops, rattling of paper, movement of children in their chairs & whispers, ventilation apparatus, etc..

External noises include jet planes (a school near the airport), trains (a school just adjacent to rail tracks), street traffic (schools on busy arteries) & road repair.

However, generally all the internal & external noises do not disturb the classes, specially when these are a little active, since children's voices and their movement around the CR cover most of the noises mentioned above.

2. FINISHING MATERIALS IN THE CRS

Floors: One CR has a painted concrete surface (the church basement), one CR has a terrazzo flooring, 3 CRs are covered byresilient sheets, 21 CRs have vinyl asbestos tiling, & 6 CRs are carpetted.

Walls: 23 CR walls are of concrete block, 2 have acoustic tiles on the upper parts of concrete block, plaster is found in 2 CRs in conjunction with conc.blocks or with brick, & alone in 4 CRs.

Moreover, one CR has also wood accordeon partitions, & 3 have vinyl covered folding partitions.

Ceilings:In 10 CRs the ceiling are completely covered by acoustic tiles or panels, & in 2 partially covered by perimetric ac. tiles on concrete. 4 ceilings are plastered & 5 others carry acoustic plaster. Painted flat concrete is found in 5 CRs, & with structural patterns in 3 CRs. One ceiling is metal deck, & 2 are wood.

1.4.1. STUDENTS

1. 'Do you hear very well, fairly well, or not well, what the teachers say, what the others say, the TV, & the music?'

   (See App.1, Sec.4.1.)

The students are most satisfied with hearing their teachers (71%), and least satisfied with the TV (29%). However, the reason of this is not so much the bad acoustics of the CRs, but the lack of TV (and Radio) facilities in those CRs. Indeed, 40% of the students have abstained from replying to 'TV', & 20% from replying to 'Music'.

2. Totals of 'Very Well' Responses to 3 or 4 cases together

   (See App.1, Sec.4.1.5.)

About a third of all students hear 'very well' all 3 or 4 of the 'teachers', 'others', 'TV' & 'Music'.

The 8 CRs with most satisfactions rate 85% & higher for 'hearing the teachers', & 38% & higher for the 3 or 4 cases, while the 8 CRs with least satisfactions rate 53% & lower for 'teachers' & 13% & lower for 3 or 4 cases.

3. Effect of Finishing Materials

Are there differences due to the finishing Materials?

Contrary to expectations, carpetted CRs show a lower satisfaction with 'hearing the teachers' (60%) than CRs without carpets (74%). And as for CRs which have other finishing materials on the walls exclusively or in conjunction with concrete blocks, no differences are observed in the rating of their students compared to those in CRs with concrete block only.

In CRs with acoustic panels or tiles on the ceiling a slightly higher proportion of students hear the teachers 'very well', while in CRs with ordinary plaster ceilings a somewhat lower percentage hears 'very well'. No differences occur in CRs with acoustic plaster or other materials covering the ceiling.

From these results it is hard to establish any direct relationships.

9. Effect of CR shape

Although anticipated, no appreciable differences occur between the responses of the students in CRs various plans.

10. Mutual Effects of Responses to 'Sitting Place' & Responses to 'Acoustics'

No relationships are found.

11. Grouping : Seating Arrangement

(See App.4 , Sec.2.1.2,No.4.)

Similarly, no statistical significance is calculated from the results.

12. Grouping : Class Type

(See App.4 , Sec.2.1.2, No.4.)

Students in CRs with fixed partitions generally hear their teachers better than students in CRs with operable partitions, & much better than those in CRs with no partitions.

These results, however, are somewhat obscured when we consider the 'hearing of 3 or 4 cases together'. Then CRs with operable partitions come first, & again without partitions come last.

13. Effect of Windows

Again, contrary to expectations, no discernible relationship is found between the amount of window surfaces & students' responses to 'Acoustics'.

14. Mutual Effects of Responses to 'Thermal Atmosphere' & Responses to 'Acoustics'

(See App.3 , Sec. 1.4.)

There may be a certain direct relationship between the two responses, but it is not very well established in this study.

4. Effect of Area

(See App.3, Sec.1.4.)

Children hear the teachers equally 'very well' both in CRs of largest areas & smallest areas, but in the latter the overall hearing is better than in the former.

5. Effect of No. of Students

(See App.3, Sec.1.4.)

Also, slightly higher satisfactions are recorded in CRs with smaller enrollment than in CRs with larger enrollments.

6. Effect of Area Per Student

(See App.3, Sec.1.4.)

Similarly, where the area/student is max., children hear 'very Well' their teachers more often than in CRs where the area/student is min.

Conversely, however, no appreciable differences in area number of students & area/student are noticed between the CRs of highest & the CRs of lowest satisfactions with the acoustics. Therefore, it is difficult to establish firm relationships between these factors.

7. Grouping : No. of Students per CR

(See App.4, Sec.2.1.1, No.4.)

The above relationships are further obscured when we consider the 3 categories with respect to No. of children per CR.

However, in hearing 3 or 4 cases 'very well', the children in less populated CRs give higher ratings than those in more populated CRs.

8. Mutual Effects of Responses to 'Area' & Responses to 'Acoustics'

(See App.3, Sec.1.4.)

On the other hand, when we consider the children's responses to 'Area' & their responses to 'Acoustics', we find strong direct relationships. Thus, the highest satisfactions with 'area' induce higher acceptance of 'acoustics' than the lowest satisfactions with 'area'. And vice versa.

15. Mutual Effects of Responses to 'Lights' & Responses to 'Acoustics'

(See App.3, Sec.1.4.)

Very direct and strong relationships are discerned between the responses to the luminous environment & those to the aural environment.

Thus, in a very clear manner, when the students show highest satisfactions with the 'lights' of their CRs they also give higher ratings to the 'acoustics' & when they show lowest satisfactions with the 'lights', their ratings for 'acoustics' drop too. And vice versa.

1.4.2. TEACHERS

1. 'Do you consider the Acoustics of your CR)
2. 'Do you consider the Noise Reduction in your CR)

adequate, barely adequate, or inadequate?'

(See App.1, Sec.4.2.)

Teachers are generally highly satisfied with the acoustics of their CRs & a little less so with the noise reduction. We find 100% of the teachers approving 'acoustics' in 11 schools, & 'Noise reduction' in 3 schools.

3. Mutual Effect of Responses to 'Acoustics' & Responses to 'Noise Reduction

(See App.3, Sec.2.4.)

As it would be expected satisfactions with 'acoustics' & satisfactions with 'noise reduction' are strongly & directly related to each other.

4. Comments on 'Acoustics' & 'Noise Reduction'

Teachers in 6 schools complain that their CRs are not soundproof (noises come in from adjacent CRs or the corridors). In one school the need for carpetting & soundproofing is mentioned, to provide adequacy for activist methods. In another school the complaint is about echoes.

One school which has carpetting is said to have good acoustics & noise reduction ("We make no special effort to be heard").

In 2 schools without partitions, the acoustic environment is not very satisfactory. In one, the complaint is that the children cannot internalize. In the other the teachers state that carpets are not sufficient to reduce noise.

However, in the third school without partitions, & in another with folded partitions, the general impression is very positive.

It is interesting to note that in the question about what to change in the CR, only once the acoustic problem is mentioned.

5. Effect of Finishing Materials

No conclusions can be made about the responses with respect to the finishing materials in the CRs.

6. Mutual Effects of Responses to 'Area' & Responses to 'Acoustics'

(See App.3 Sec.2.4.)

When teachers are most satisfied with the 'area' of their CRs, they give higher ratings to 'acoustics', than when they are least satisfied. And vice versa.

7. Mutual Effects of Responses to 'Area' & Responses to 'Noise Reduction'

(See App.3 , Sec.2.4.)

The same can be said for 'Noise Reduction'.

8. Mutual Effects of Responses to 'No. of Students' & Responses to 'Acoustics'

(See App.3 , Sec.2.4.)

Teachers seem more satisfied with the 'acoustics' when they are most contented with the 'No. of Students' than when they are least contented with it. The reverse is not so apparent, however.

9. Mutual Effects of Responses to 'No. of Students' & Responses to 'Noise Reduction'

(See App.3 , Sec.2.4.)

A certain direct relationship is found also between these two factors.

10. Effect of CR Shape

Teachers' responses vary according to the shape of the CR plan. However, these variations are not consistent, & do not lead us to solid conclusions.

Lowest ratings of the aural environment occur in square CRs, while the highest occur in nearly square CRs,& the intermediate ratings in the rectangular rooms.

11. Grouping : Class Type

(See App.4 , Sec.2.2.3, No.4.)

Teachers in schools with operable partitions give the highest ratings to the aural environment, while those in schools without partitions give the lowest ratings.

12. Effect of Windows

Teachers in Crs with smaller window areas rate the aural environment lower than in CRs with larger windows.

13. Mutual Effects of Responses to 'Thermal Atmosphere' & to 'Acoustics'

(See App.3 , Sec.2.4.)

When teachers give the highest ratings to the adequacy of the 'thermal atmosphere' of their CRs they are also more satisfied with the 'acoustics' of their CRs, than when they give the lowest ratings to the 'therm. atm.' And vice versa.

14. Mutual Effects of Responses to 'Thermal Atmosphere' & Responses to 'Noise Reduction'

No effects are seen.

16. Mutual Effects of Responses to 'Ventilation' & responses to 'Noise Reduction'

(See App.3 , Sec. 2.4)

Here an inverse relationship is observed, i.e. when satisfactions run highest with 'ventilation', they are low with 'Noise Reduction,' & Vice versa.
Is this because ventilators make a certain noise?*

15. Mutual Effect of Responses to 'Ventilation' & Responses to 'Acoustics'

No effects are seen.

17. Mutual Effects of Responses to 'Lighting' & Responses to 'Acoustics'

(See App.3, Sec.2.4.)

18. Mutual Effects of Responses to 'Lighting'& Responses to 'Noise Reduction'

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* This is another point worth studying.

(See App.3 , Sec.2.4.)
Very slight direct influences are observed in both cases.

1.4.3. TEACHERS AND STUDENTS COMPARED

Once more it is seen that students are more critical than their teachers, this time with respect to the aural environment.

While only 29% of the students rate 'very well' 'hearing everything' ('teachers', 'others', 'TV', 'music'), 80% of teachers find the 'acoustics' 'adequate', & 65% find the 'noise reduction' so.

The ratings for 'hearing the teachers' (71%) come closer to the teachers' responses.

However, students' & teachers' responses regularly correspond to each other.

Thus, in the schools where the students are most satisfied with 'hearing the teachers', the teacher ratings for 'acoustics' & 'noise reduction' are the highest, & vice versa. Similarly where students' 'hearing everything' is the highest, 'acoustics' & 'noise reduction' receive the greatest approval, & vice versa.

The same is true also for the lowest limits.

Students & teachers nearly agree too when we consider the categories according to class type.

CRs with operable partitions receive the highest ratings both by students & teachers, CRs with fixed partitions come second, closely following the first type (except in 'hearing the teachers very well', where they precede operable partitions by a small margin), & CRs without partitions come third, considerably at a lower ratings than the other 2 types.

1.S. SUMMARIES

1.1. THE SPATIAL ENVIRONMENT

1.1.1. STUDENTS

(See Graphs 1.1.1. & 1.1.1.a.)

- The larger CRs are more, and more densely populated than the smaller CRs.
- Only a little less than half the students are satisfied with their CR areas.
- Responses to 'Area' show inverse relationships with actual area & actual enrollment of the CR, & direct relationship with the area per student.
- Satisfactions with the area increase from wide rectangular to long rectangular to square CRs.
- Children sitting near the windows show the highest satisfaction with their sitting place.
- Students seem to be accepting their CR areas, in CRs with moving & no partitions more than in CRs with fixed partitions.
- Surprisingly, less window areas evoke more satisfaction with CR areas.

1.1.2. TEACHERS

(See Graphs 1.2.1. & 1.2.1.a.)

- Almost half of the teachers consider the area of their CR adequate, and almost 2/3 consider the no.of students in their CR adequate.
- Responses to 'Area' & those to 'No. of students' are directly & strongly related.
- In their comments teachers generally complain of the lack of space.
- About 3/5 of the teachers find the storage spaces in their CRs inadequate or barely adequate.
- Responses to 'Area' & those to 'storage' are also directly & strongly related.
- The lack of storage too is very well reflected in the comments.

- Highest satisfaction with the area occurs in CRs with operable partitions, & the least in those without partitions.

- Three quarters of the teachers find the windows of their CRs adequate.

1.1.3. STUDENTS AND TEACHERS

- A higher proportion of students than of teachers is dissatisfied with the CR area.

- Classrooms with operable partitions evoke higher satisfactions both among students & teachers.

1.2. THE THERMAL ENVIRONMENT

1.2.1. STUDENTS

(See graphs 1.1.2.)

- About two thirds of the students are satisfied with the thermal atmosphere of their CRs.
- The responses to 'thermal atmosphere' are inversely & strongly related to area & number of children.
- These responses seem to be affected by the different heating systems.
- A slight & direct relationship is seen also between responses to 'area' & responses to 'thermal atmosphere'.
- Highest satisfaction with 'Thermal Atmosphere' is recorded in CRs without partitions, lowest in those with operable partitions.

- Also, students are most satisfied in CRs with active seating patterns & least in those of semi-conventional seating.

1.2.2. TEACHERS

(See Graphs 1.2.2.)

- About two thirds of the teachers find the 'thermal atmosphere' of their CRs adequate, & a little less are satisfied with the 'ventilation.'

- Responses to 'thermal atmosphere' & responses to 'ventilation' exert direct & strong influences on each other.

- These responses are influenced also by the different heating systems.

- The most common complaint is the inconsistency of the temperature.

- A slight direct relationship is discerned between responses to 'thermal atm.' & responses to 'no. of students'.

- Least satisfactions are registered in CRs with operable partitions.

- A slight direct relationship is seen between responses to 'windows' & responses to 'ventilation'.

1.2.3. STUDENTS & TEACHERS

- The Thermal Environment evokes equal satisfaction among students & teachers.

1.3. THE LUMINOUS ENVIRONMENT

1.3.1. STUDENTS

(See Graphs 1.1.3.)

- Children are adapted to work in greatly varying luminous environments.
- Only half the students are satisfied with the 'lights' in their CRs.
- Certain direct relationships exist between light readings & light ratings.

1.3.2. TEACHERS

- Almost all teachers are satisfied with the 'lighting' of their CR.

- A certain direct relationship is noticed between responses to 'windows' & responses to 'lighting'.

- A great majority of the teachers are also satisfied with the 'colours' of their CRs.

1.3.3. STUDENTS & TEACHERS

- Students are more critical in their appreciation of the lighting than the teachers.

1.4. THE AURAL ENVIRONMENT

1.4.1. STUDENTS

(See Graphs 1.1.4.)

- Usually noises do not disturb the classes if these are conducted according to active educational methods.
- Almost 3/4 of the students hear 'the teachers' 'very well', but much less hear 'the others', 'the TV' & 'the music' 'very well'.
- Surprisingly, carpets cause a decrease in satisfactions.
- Responses to 'Area' & Responses to 'Acoustics' have direct mutual influences.
- Students hear the teachers 'very well' in highest proportions in CRs with fixed partitions & lowest in CRs without partitions.
- Responses to 'lighting' & responses to 'acoustics' are directly & strongly related.

1.4.2. TEACHERS

(See Graphs 1.2.4.)

- Responses to 'acoustics' & responses to 'Noise Reduction' exert strong mutual direct influences.
- Satisfactions with the 'Acoustics' & with the 'Noise Reduction' both run very high.
- Responses to 'acoustics' & to 'noise reduction' have direct & strong relationships with the responses to 'Area'.
- A certain relationships seems to be found also between responses to 'no. of students' & responses to 'noise reduction'.
- The highest ratings occur in CRs with operable partitions, & the lowest in those without partitions.
- A certain direct relationship is observed between responses to 'acoustics' & responses to 'thermal atmosphere'.
- A certain inverse relationship can be seen between responses to 'noise reduction' & responses to 'ventilation'.

1.4.5. STUDENTS & TEACHERS

- Students are more critical than teachers in their appreciation of the aural environment.

- High & low satisfactions by the students correspond to high & low satisfactions by the teachers.

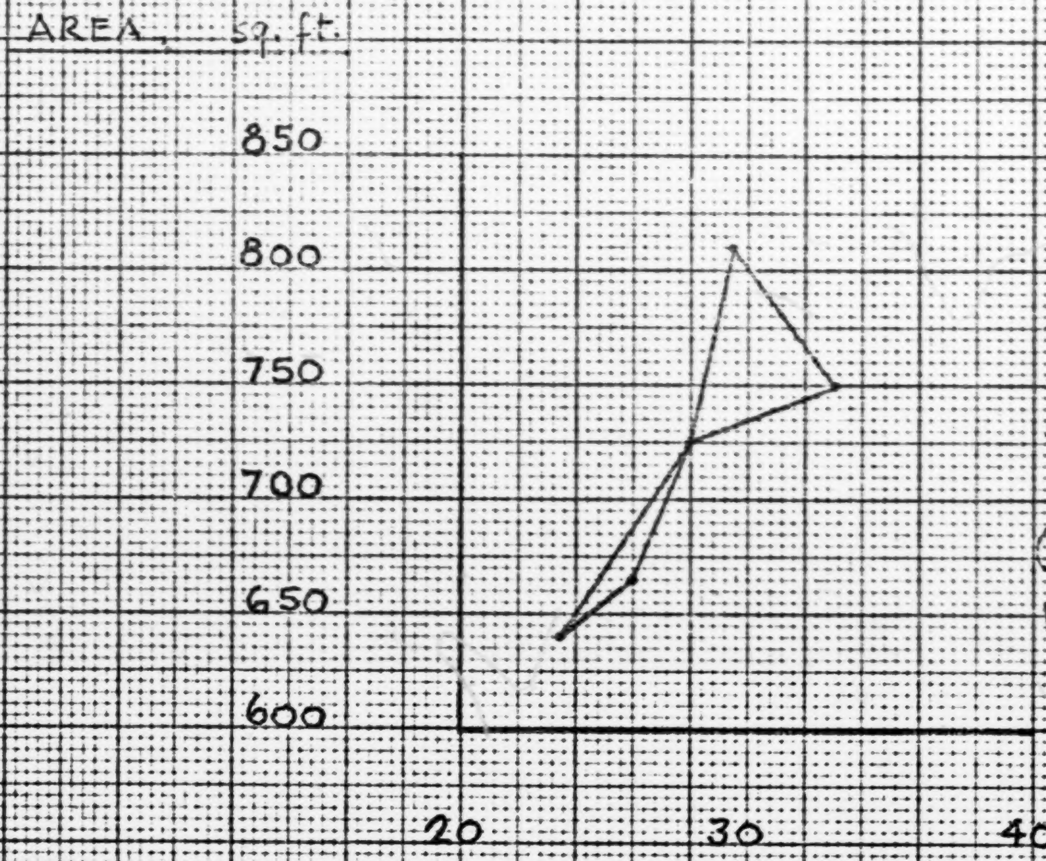
- Both students & teachers are least satisfied in CRs without partitions.

1.1. STUDENTS

GRAPHS

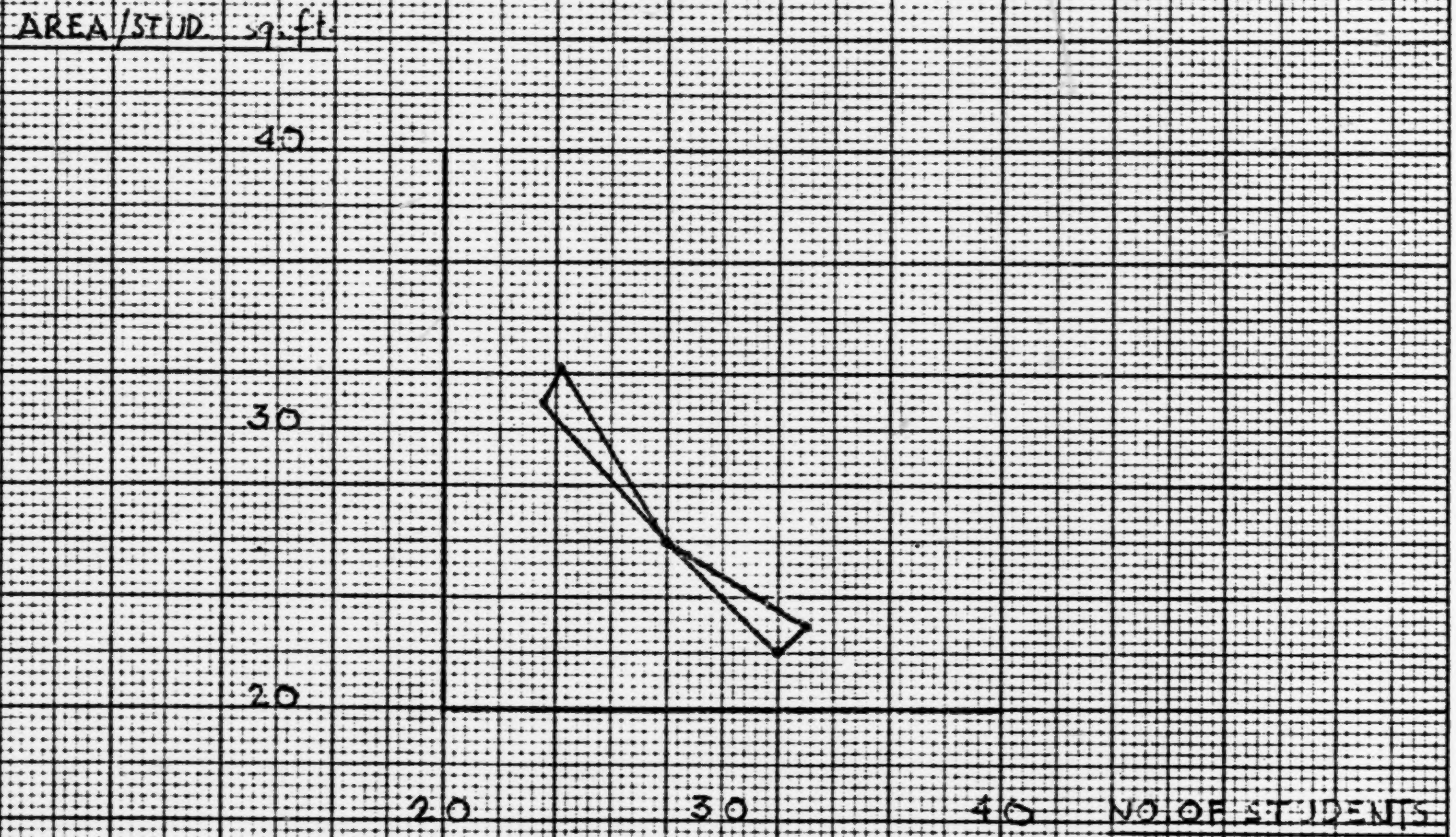
1.1.1. THE SPATIAL ENVIRONMENT

(See App. 3 - Sec. 1.1.)

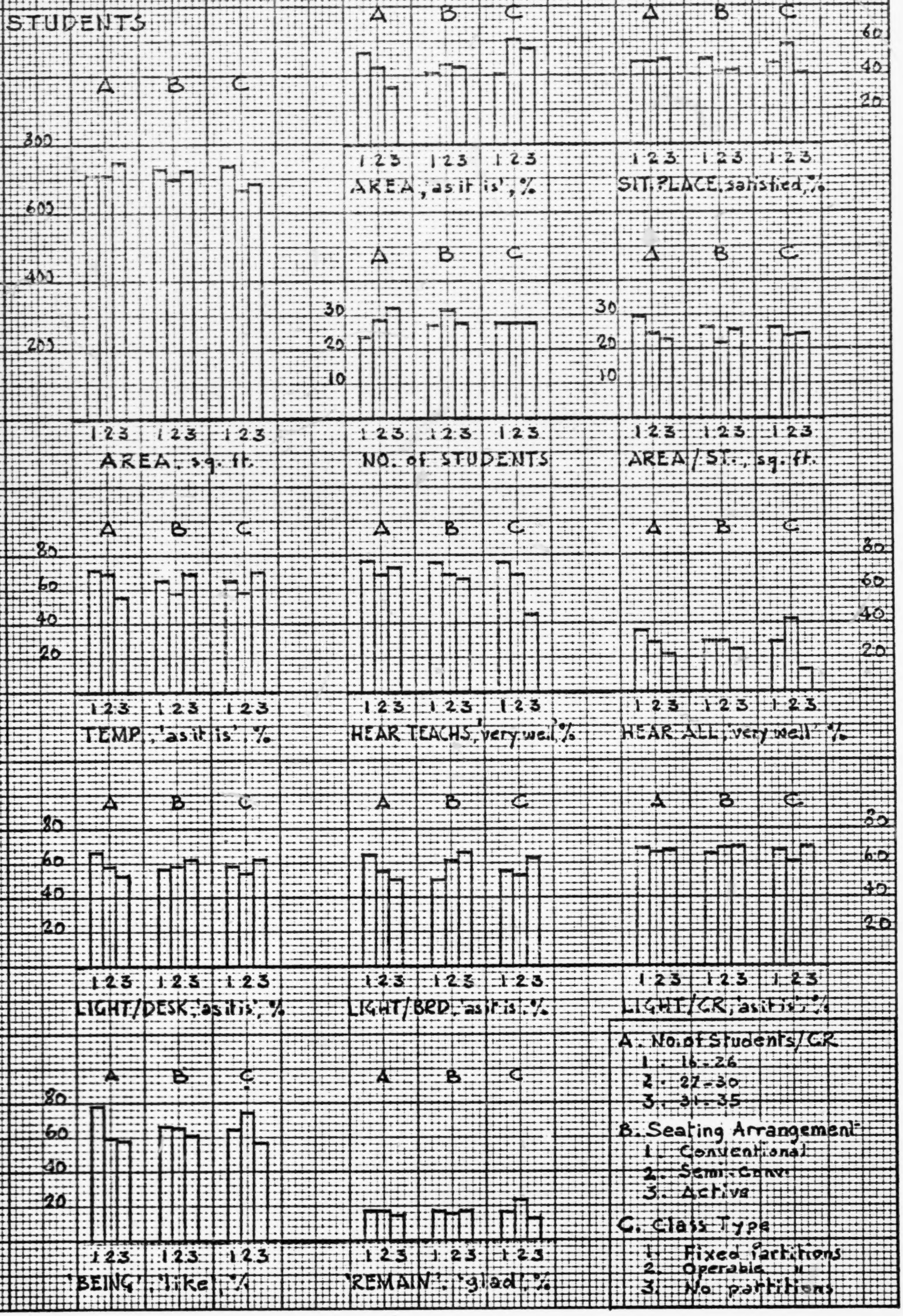


NOTE: For each pair of questions represented by a graph the majority of CRs (data or responses) falls in the triangular surfaces which meet at the intersection of the means.

The line of regression (r^2) passes through that point and those surfaces.



GRAPHS 1.1.1.a GROUPINGS



A. No. of Students/CR.
1. 16-26
2. 27-30
3. 31-35

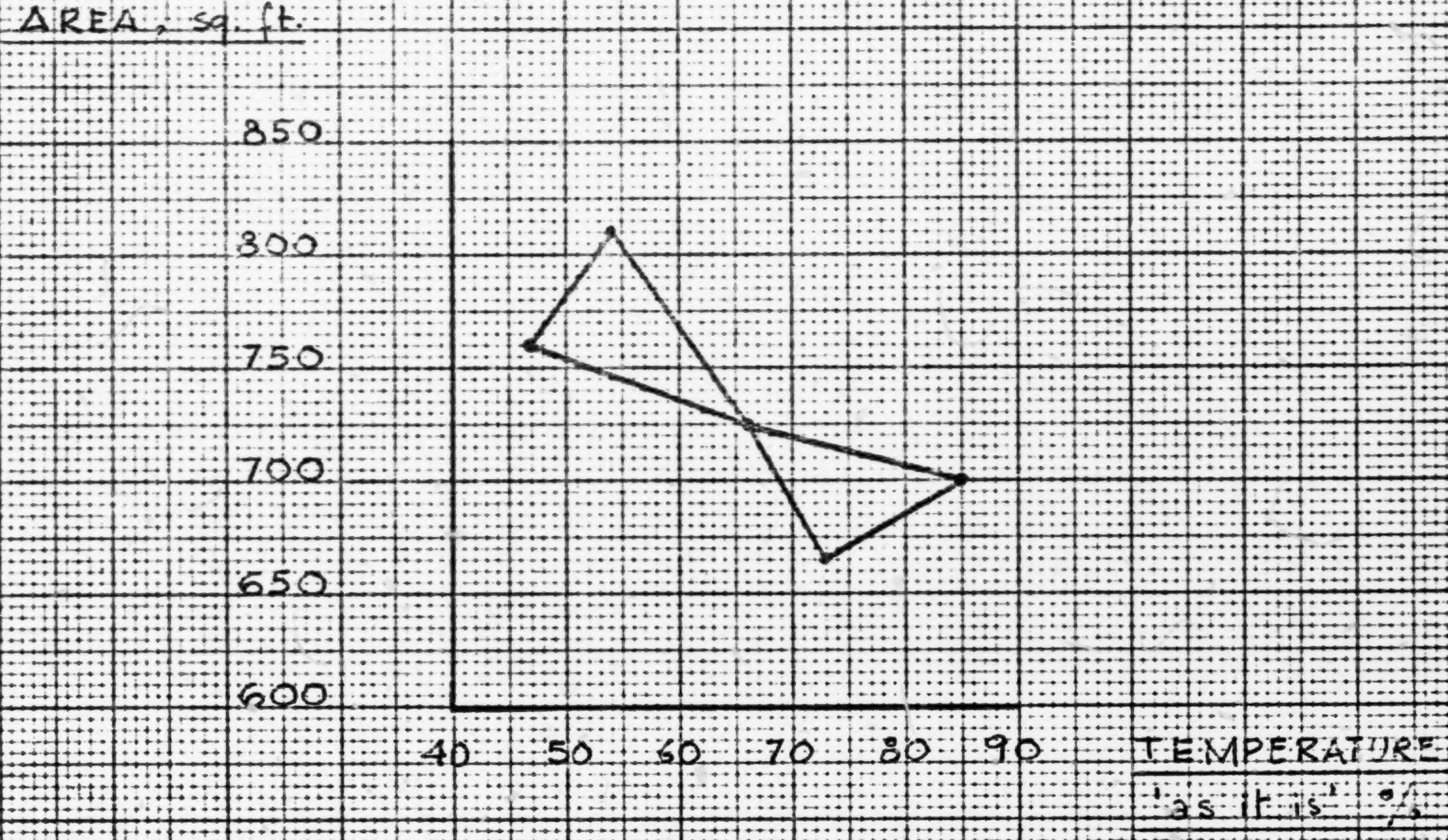
B. Seating Arrangement
1. Conventional
2. Semi-Conv.
3. Active

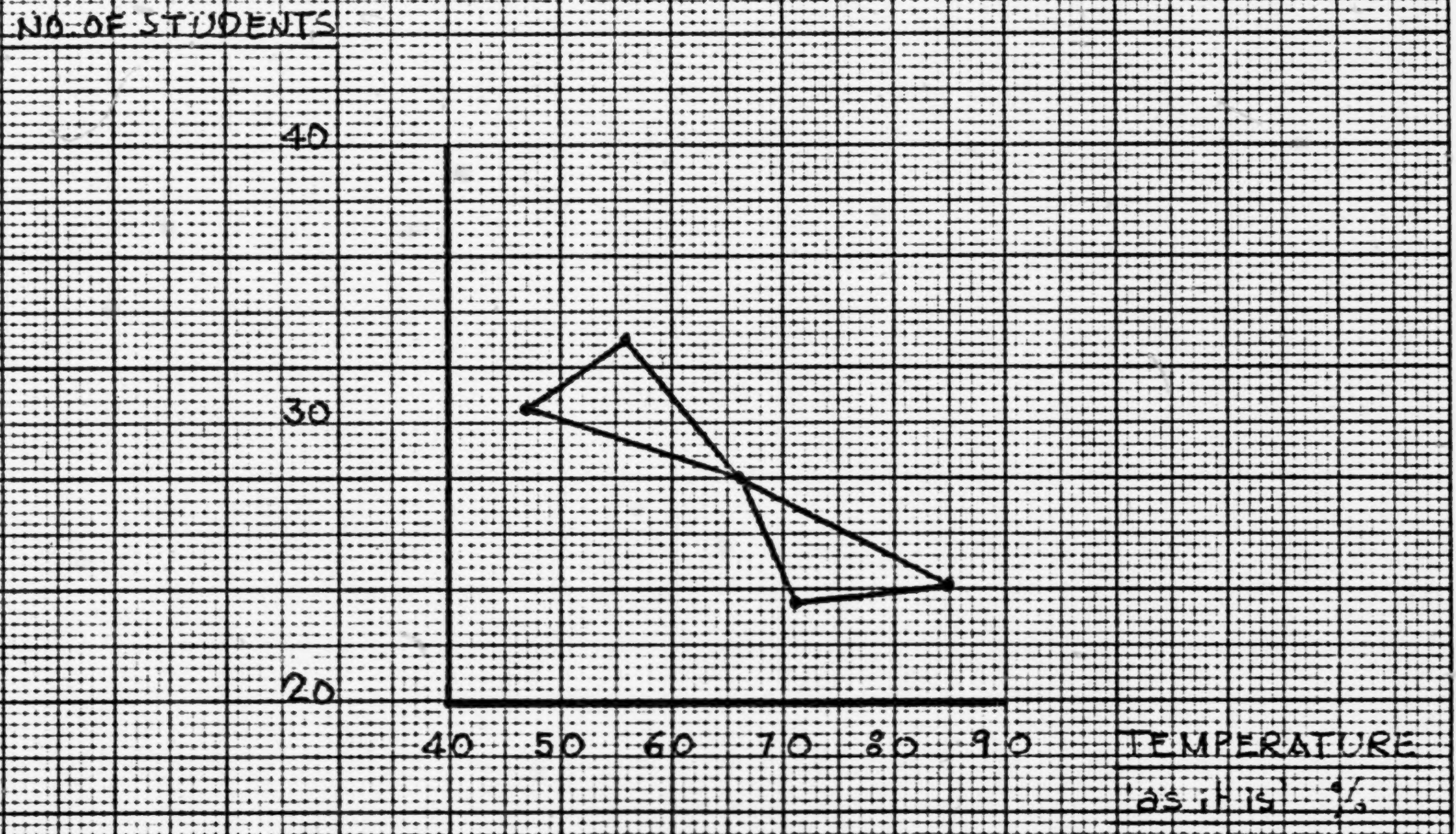
C. Class Type
1. Fixed partitions
2. Operable "
3. No partitions

GRAPHS

1.1.2. THE THERMAL ENVIRONMENT

(See App. 3 _ Sec. 1.2.)

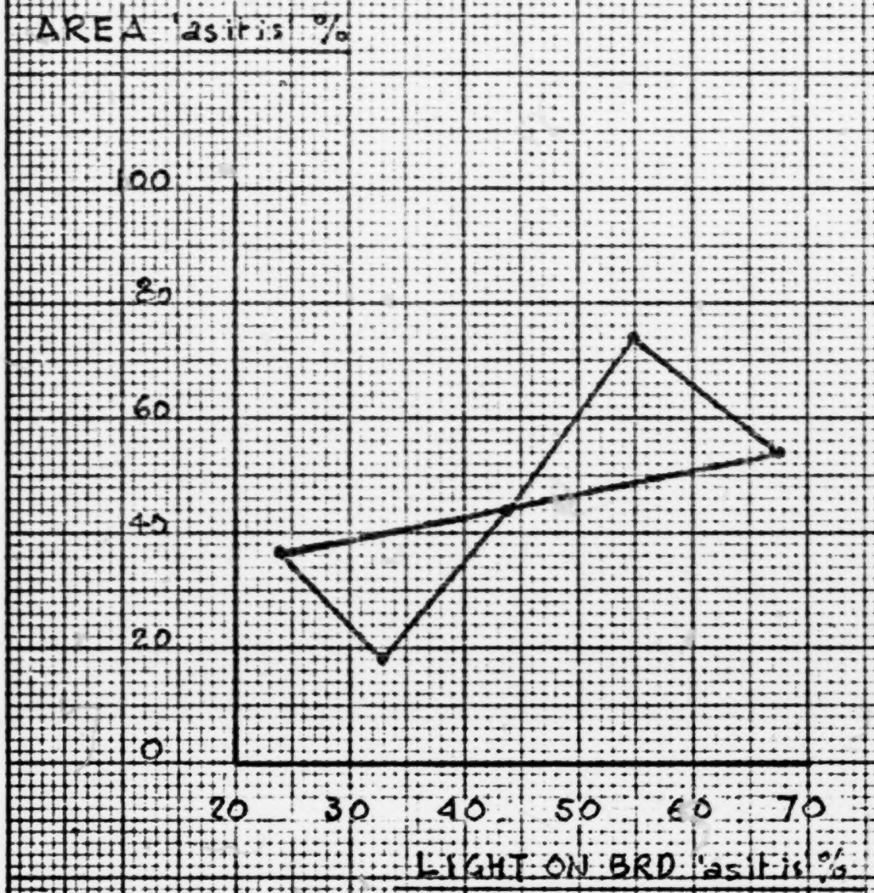


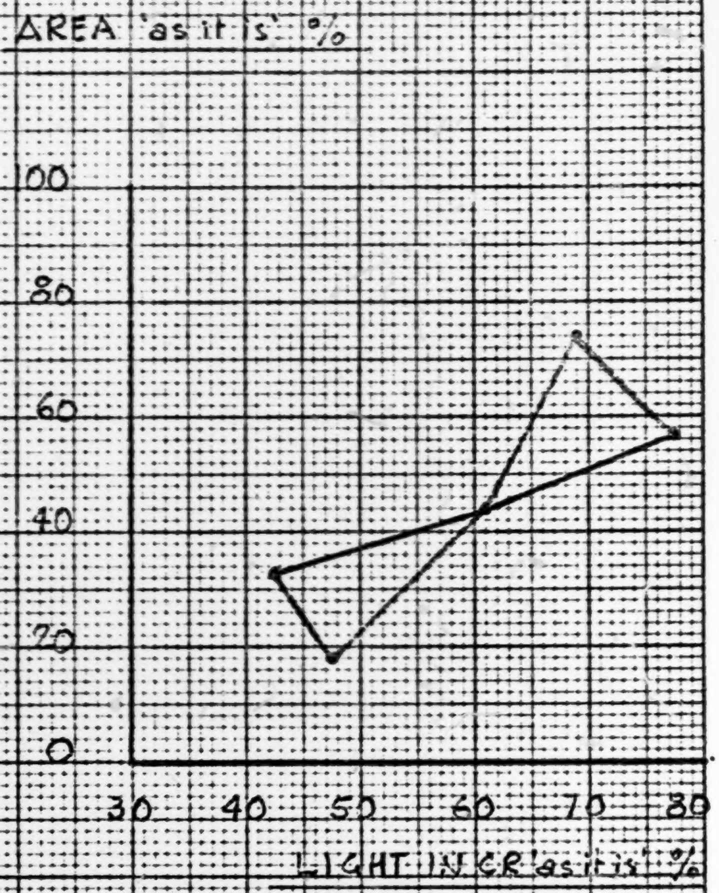


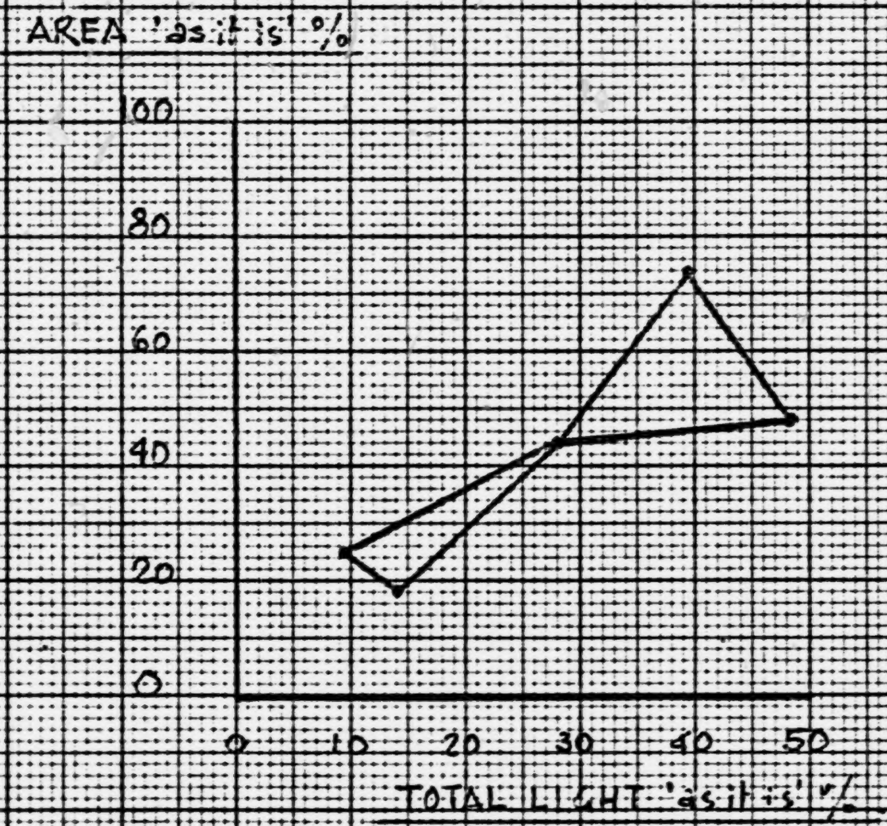
GRAPHS

1.1.3. THE LUMINOUS ENVIRONMENT

(See App. 3 – Sec. 1.3.)



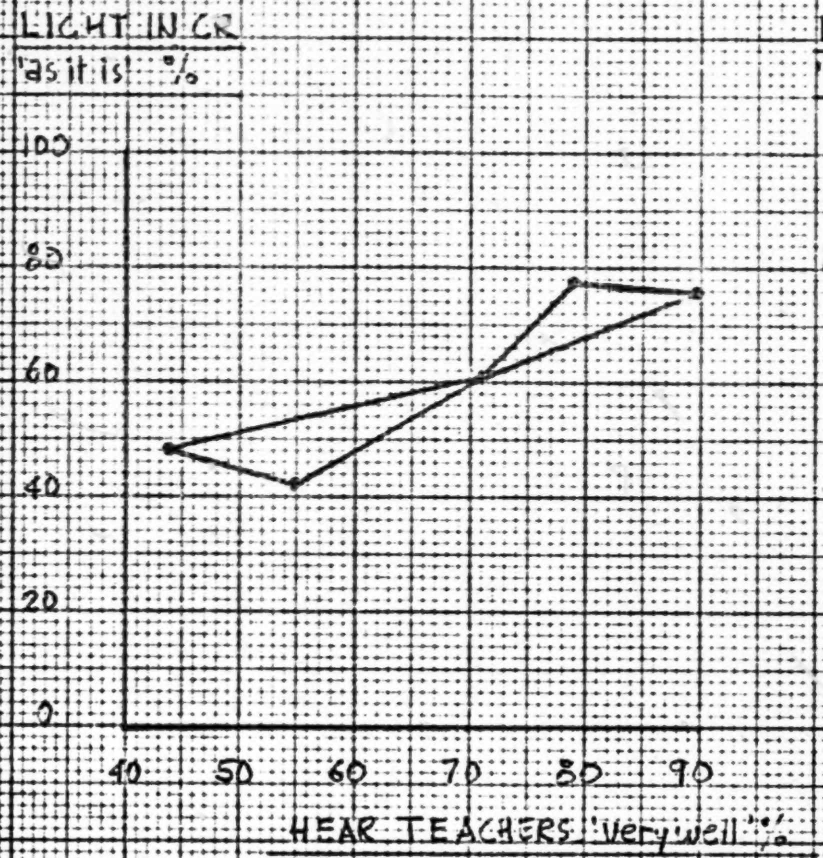


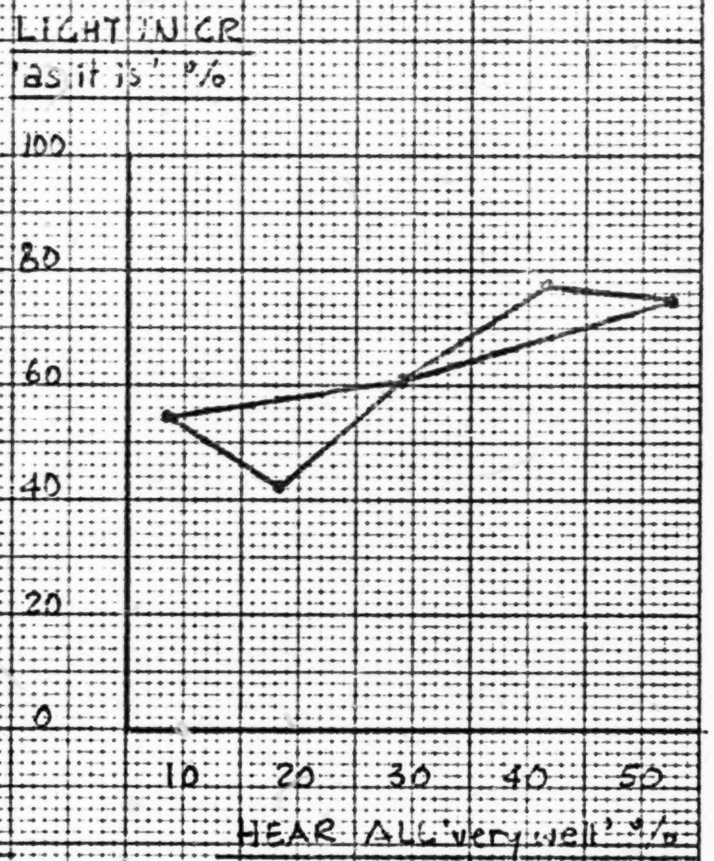


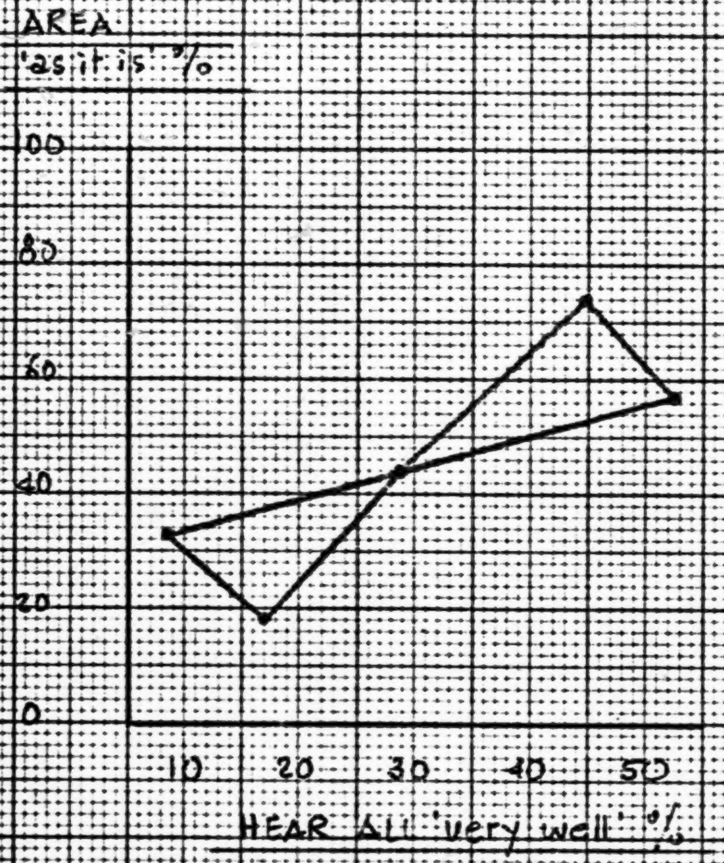
GRAPHS

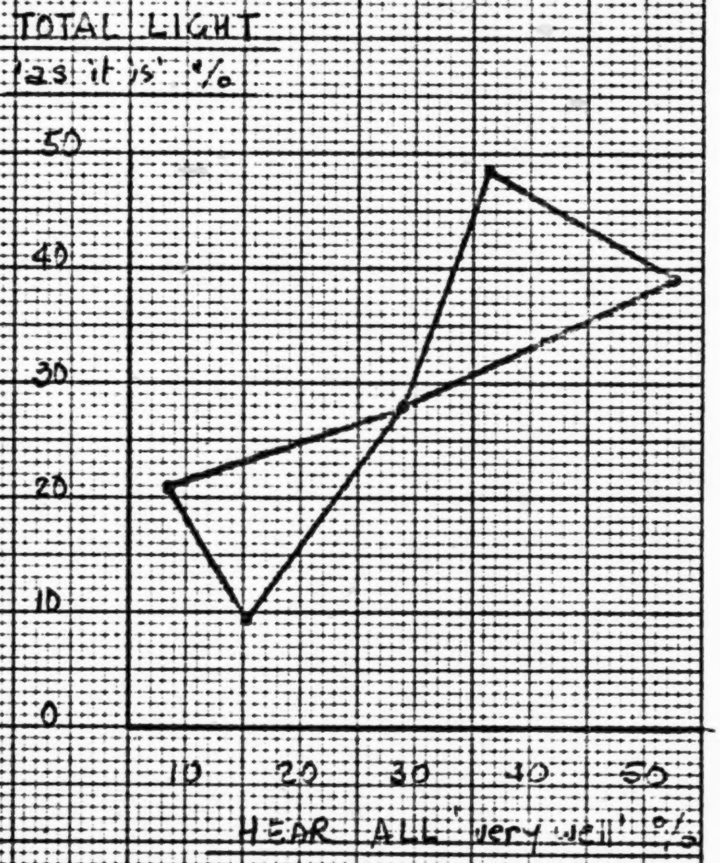
1.1.4. THE AURAL ENVIRONMENT

(See App. 3 Sec. 1.4.)







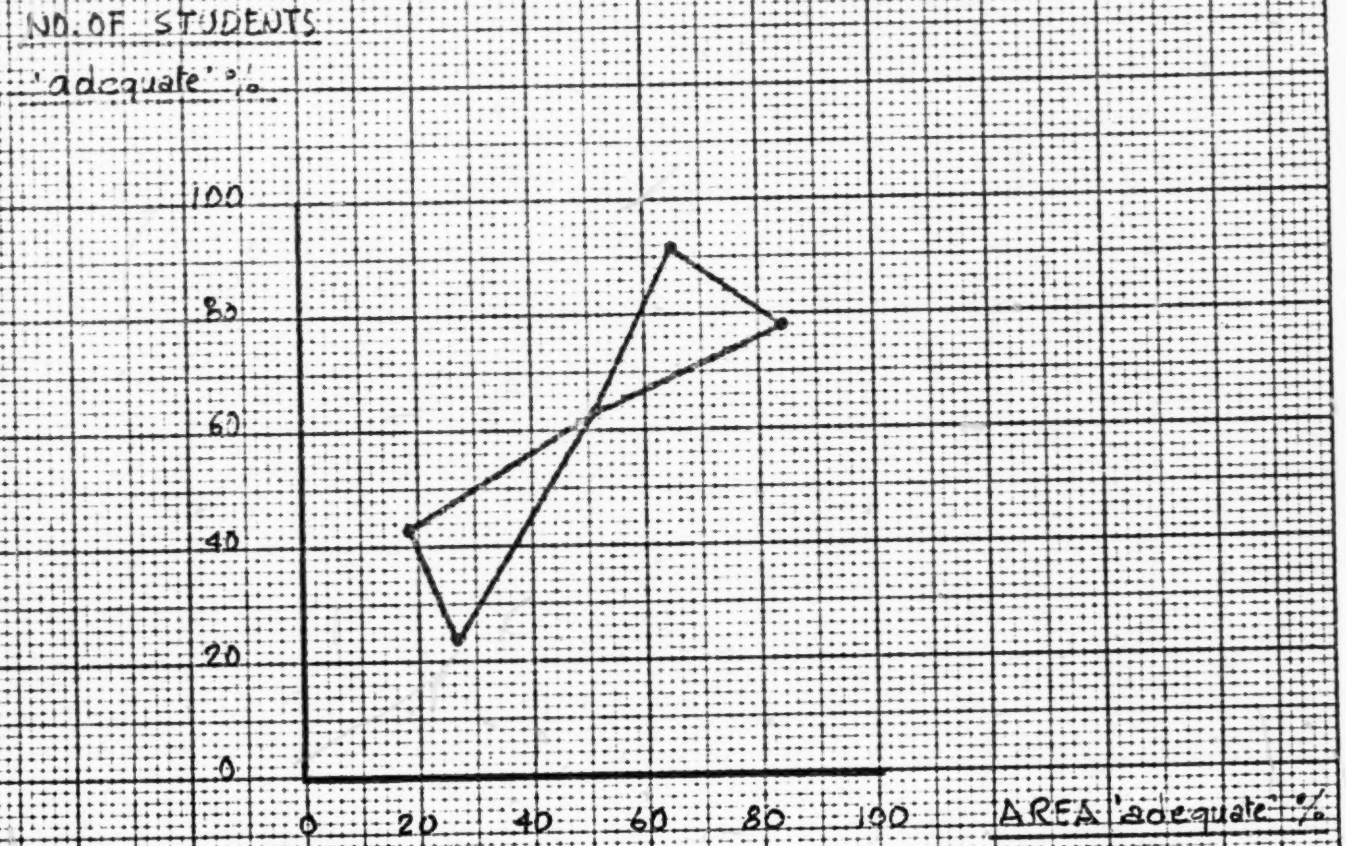


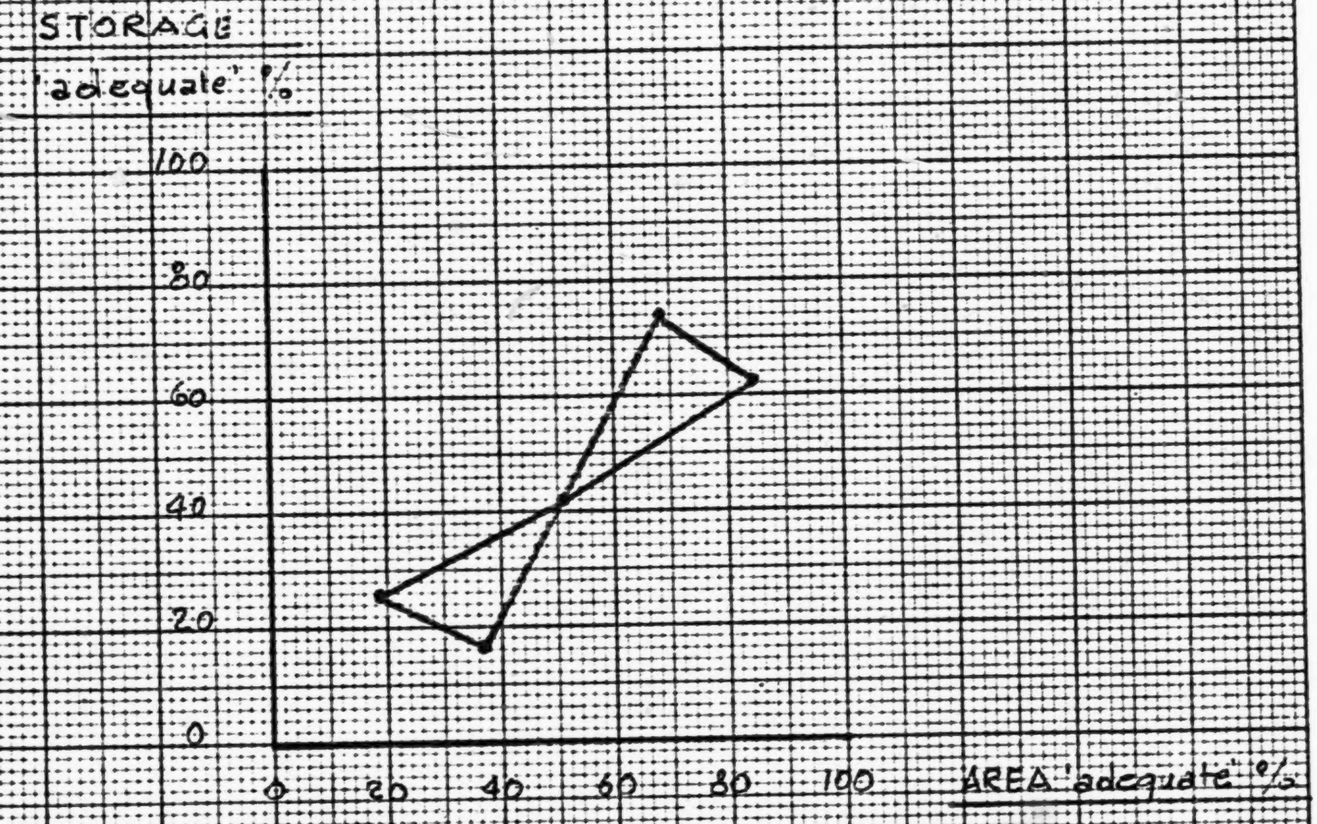
GRAPHS

1.2. TEACHERS

1.2.1 THE SPATIAL ENVIRONMENT

(See App. 3 Sec. 2.1.)

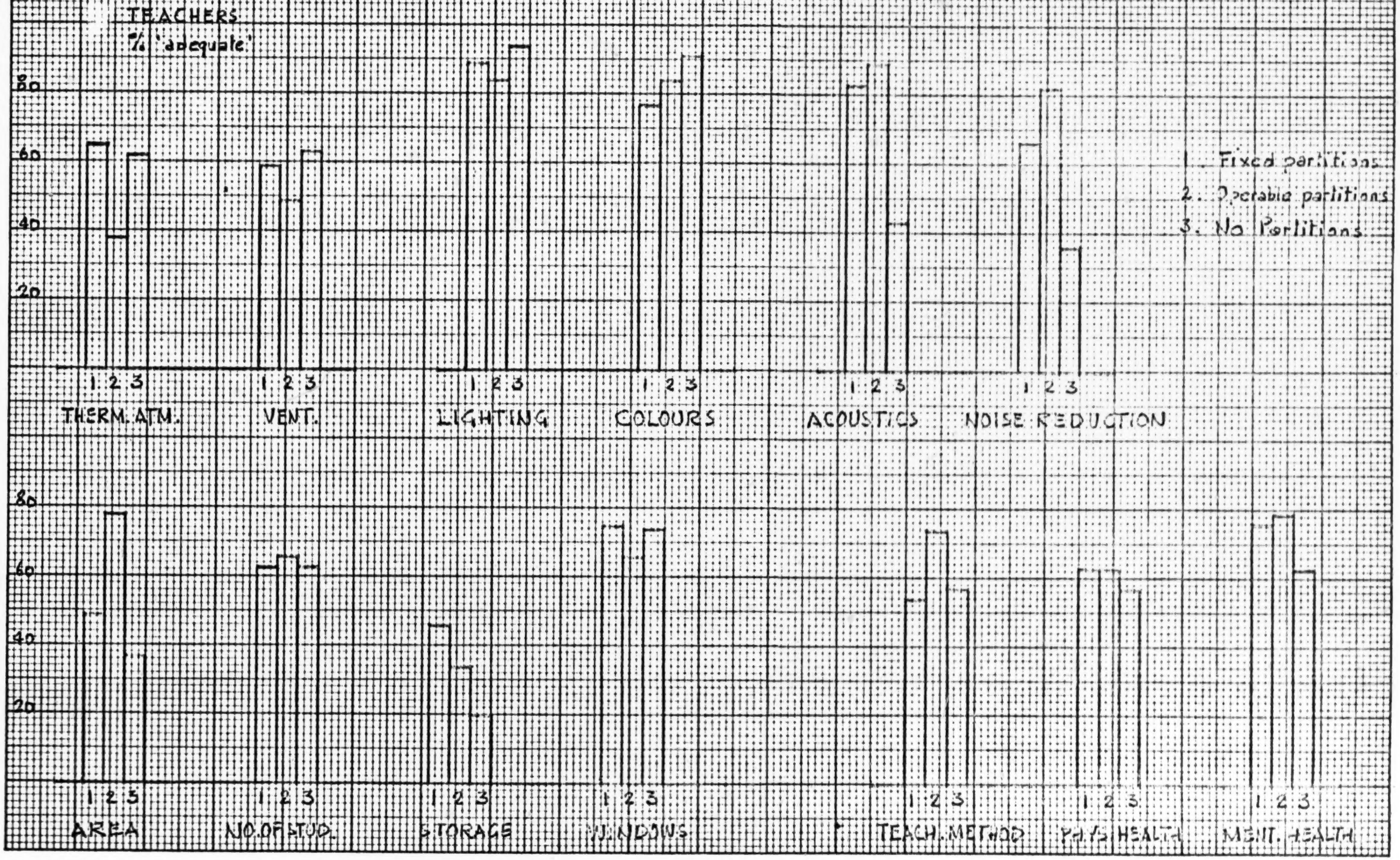




GRAPHS

1.2.1.a GROUPING : CLASS TYPE

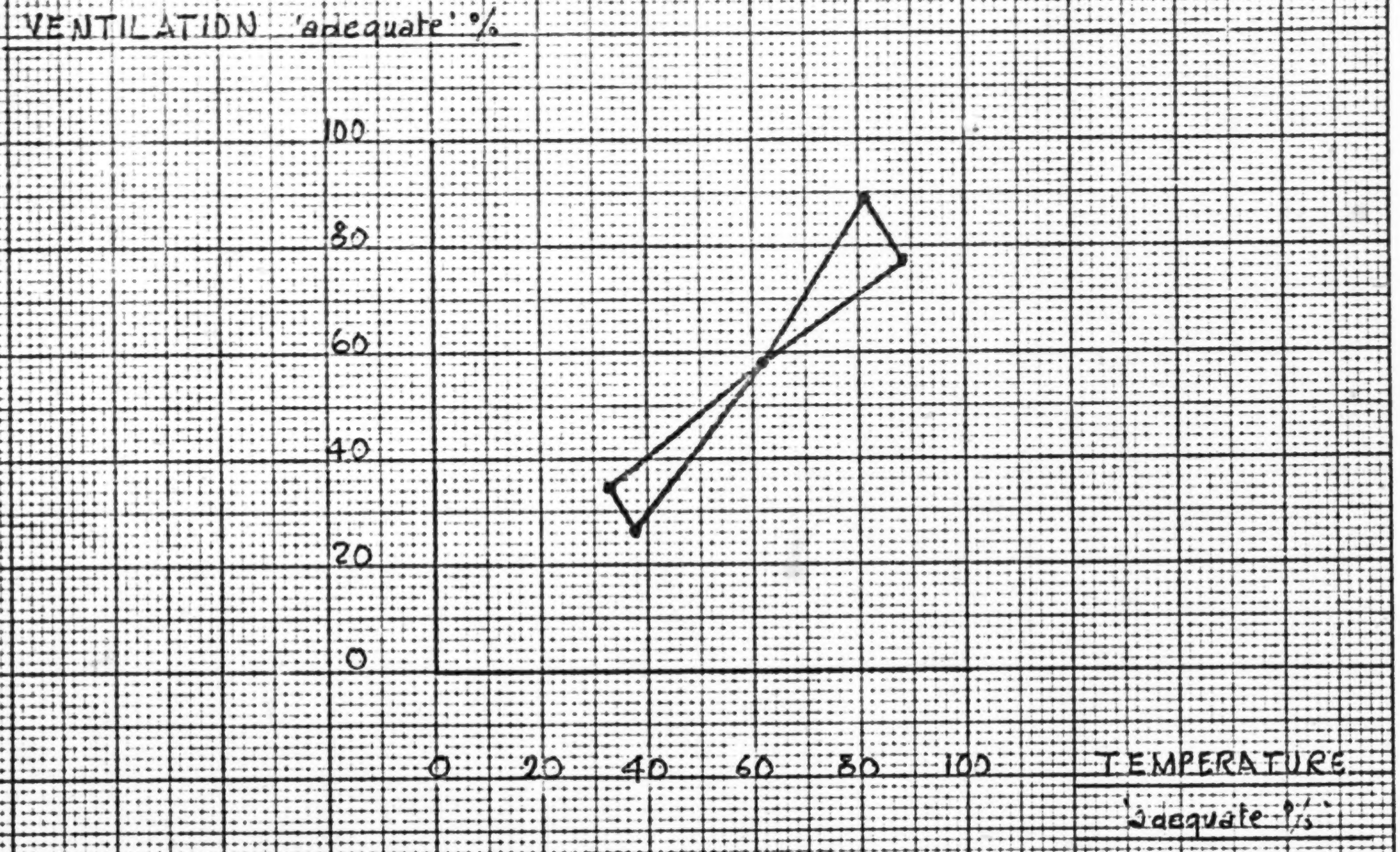
part 1 - p.54



GRAPHS

1.2.2 THE THERMAL ENVIRONMENT

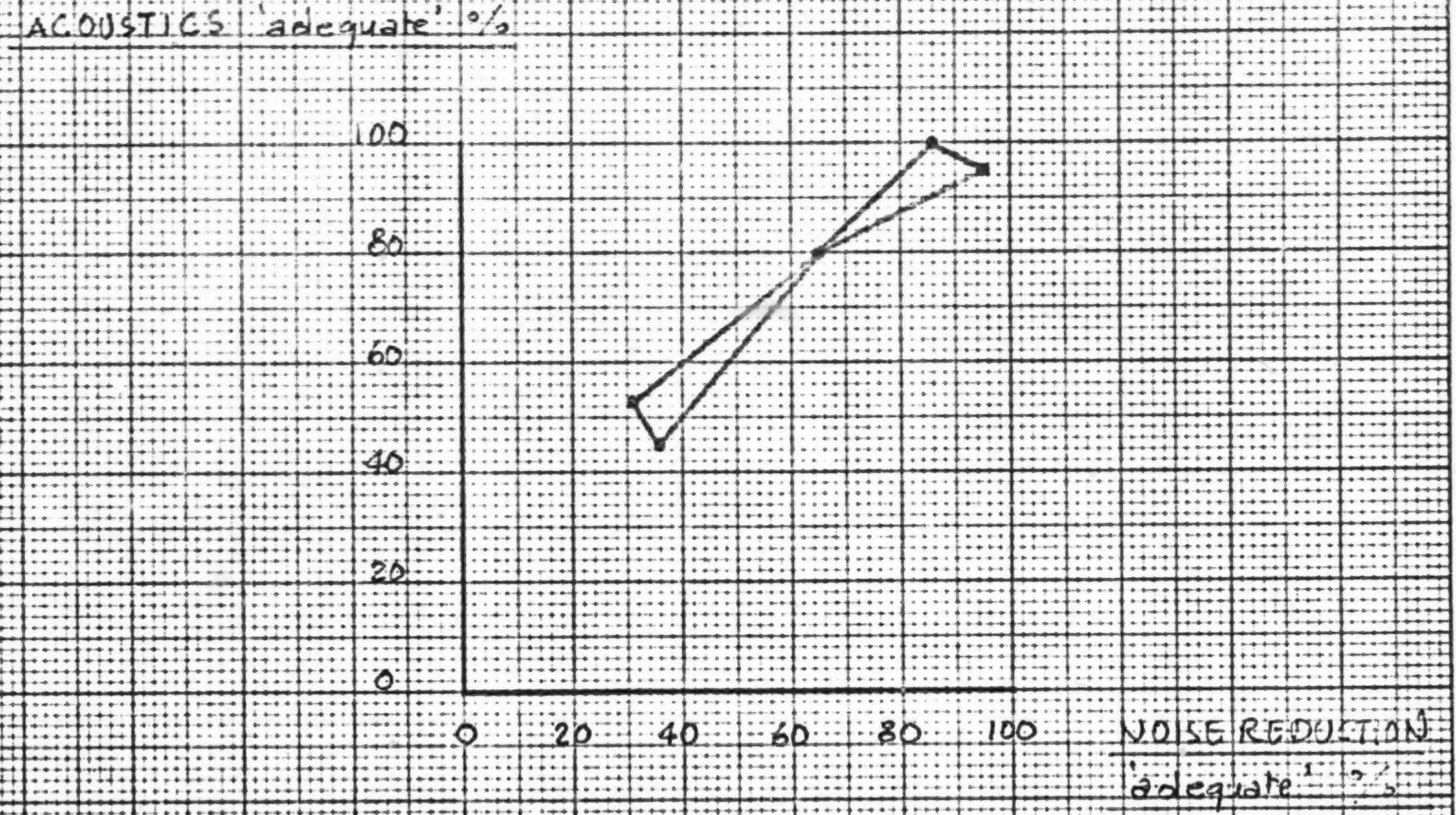
(See App. 3 Sec. 2.2.)

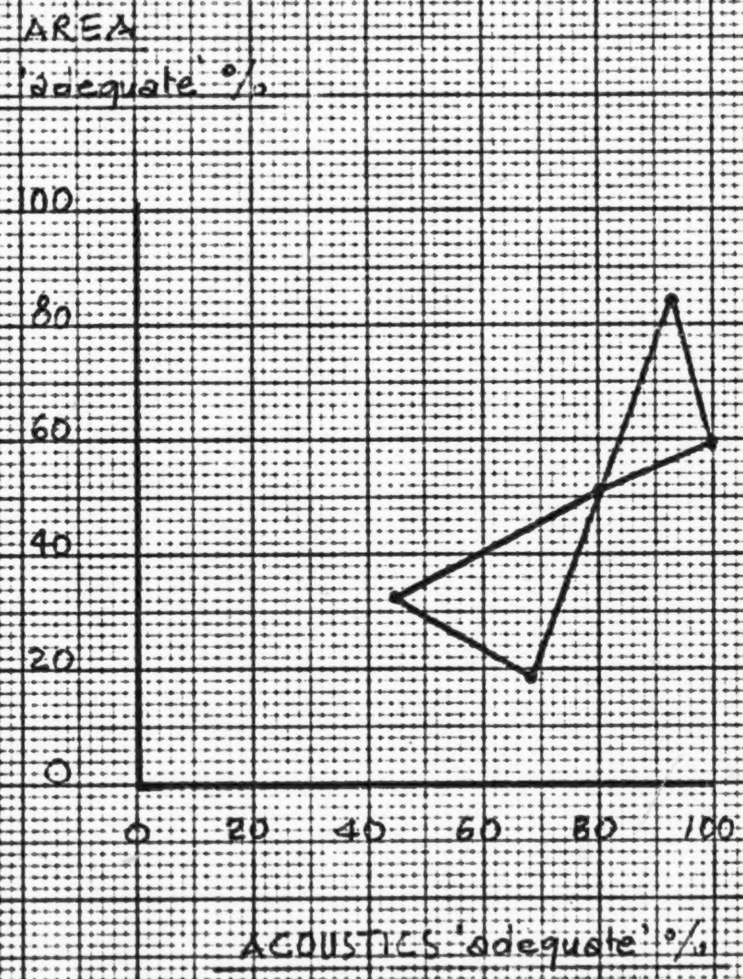


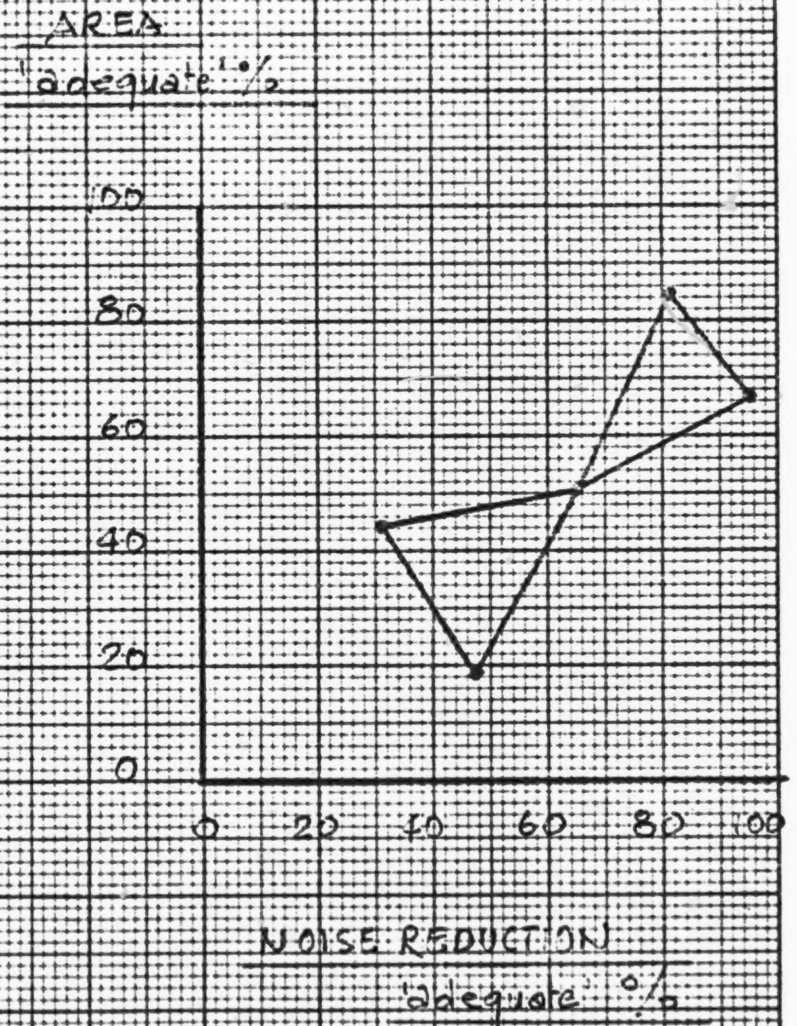
GRAPHS

1.2.4 THE AURAL ENVIRONMENT

(See App. 3 - Sec. 2.4.)







1.C. CONCLUSIONS

Environmental factors do not affect us in simple and direct ways, but exert complex influences. Thus,our reactions to the spaciousness of a room are really reactions also to its warmth, brightness, quietness, etc.

Students' responses to the spatial environment have relationships to the actual area & the enrollment of the CR, to its shape, & the amount of its window areas.

Their responses to the thermal environment are related to the heating systems, the area & the enrollment, & to the responses to the spatial environment.

The responses to the luminous environment are affected by the actual light intensities in the CRs.

The responses to the aural environment show relationships to the responses to the spatial & luminous environments.

Students show highest satisfactions with the aural environment (hear the teachers), & the thermal environment,intermediate satisfactions with the luminous environment, & lowest satisfactions with the spatial environment.

Teachers complain of the lack of space in the CRs.

The responses to the thermal environment have relationships to the heating systems& to the responses to the spatial environment. Again, there are complaints of the inconsistency of the thermal atmosphere.

The responses to the aural environment are related to the responses to the spatial & the thermal environments.

Teachers' satisfaction are highest with the luminous environment, then the aural environment, & lowest with the spatial environment.

The type of CR partitions affects the students' & the teacher responses to the spatial, thermal & aural environments, & the seating arrangements in the CRs affect students' responses to the thermal environment & their attitudes.

The students are more critical towards their physical environment,than their teachers.

PART TWO

ATTITUDES AND THE ENVIRONMENT

2.1. STUDENTS

The attitudes of the students are "measured" by means of two questions,

1-'Do you like being in your CR?'

2-'If asked to remain longer in school would you be glad, not mind, or be sad?'

These two questions are considered in conjunction with each other, & then with respect to the student reactions to the environmental aspects of their CRs, in order to establish certain relationships between these aspects & those attitudes.

Of course, attitudes are under many other influences, specially that of the human environment, but that is outside the scope of this thesis.

1) Being In The Classroom

(See App.2 , Sec.2.1.1.)

Two thirds of the students in general like being in their CRs, one fifth do not know whether they like it or not, & one seventh dislike it.

2) Remaining Longer

(See App.2 , Sec.2.1.2.)

Contrary to the highly positive attitudes towards the first question, this one reveals that a little less than half the students do not want to have longer school days, and only one sixth would be glad to remain a little longer, while a considerable proportion would not mind doing so. In some schools the students stressed that they woult hate to remain in school longer.

3) Mutual Effects of 'Being' & 'Remaining'

(See App.5 , Sec.1.0.)

Comparing the two questions, we find a very strong direct relationship between the two, i.e. the more students like 'being in their CR', the more they would be 'glad to remain longer in school', & vice-versa.

2.1.1. THE SPATIAL ENVIRONMENT

(See App.5 , Sec.1.1.)

1) Area

Children are happier in CRs with smaller areas than in CRs with larger areas.

Both 'Being' & 'Remaining' have higher positive responses in the smallest CRs than in the largest CRs, & vice-versa.

2) No. of Students

Also the greater the number of students in the CR, the less the proportion of those who 'like being in their CR',or who would 'be glad to remain longer in school'.

This relationship is stronger in the case of 'Being' than 'Remaining'.

Conversely, more positive attitudes are recorded in CRs of smaller enrollments.

3) Area Per Student

This is a controversial factor, since the area gives higher satisfaction when decreasing, i.e. diminishing the area per student, while the number of students, which also gives higher satisfaction when decreasing, in fact would increase the area/st. by doing so.

Therefore the combined effect is a very weak relationship, almost nil in the case of 'Remaining'; with larger area/ students, more 'like' responses are given to 'Being',& vice versa.

4) Grouping : No. of Students/ CR

(See App.4 , Sec.2.1.1, No.5.)

The highest proportion of 'like being in the CR' occurs in the CRs with 16-26 students, & no difference is seen between CRs of 27-30 & 31-35 students.

'Remaining longer in school' shows no significant differences, although CRs of 16-26 & 27-30 have slightly more positive responses than CRs of 31-35.

5) Responses to 'Area'

A strong relationship exists between student responses to 'area' & their attitudes, The higher the satisfaction with the area, the more positive attitudes both in 'Being' & specially in 'Remaining'. And vice versa.

6) Responses to 'Sitting Place'

Contrary to expectations, no consistent or significant resemblances are found between responses to 'Sitting place' & student attitudes.

7) Grouping : Seating Arrangement

(See App.4 , Sec.2.1.2, No.5.)

Similarly, no significant differences are seen among attitudes of children in CRs with conventional, semi-conventional & active seating.

8) Grouping Class Type

(See App.4 , Sec.2.1.3, No.5.)

Again, no statistical significance is computed in the responses of students in CRs with fixed, operable or no partitions. However, in both cases ('Being' & 'Remaining'), the second type has the highest positive responses, & the third type the lowest.

2.1.2. THE THERMAL ENVIRONMENT

1) 'Thermal Atmosphere' (See App.5 , Sec.1.2.)

- There is a certain relationship between responses to the 'thermal atmosphere' & attitudes, although not as strong as in the case of 'area'.

The more students are satisfied with the temp. of their CRs, the more positive their attitudes, & vice versa. It seems that this effect is more forceful in the case of 'remaining' than of 'being'.

2.1.3. THE LUMINOUS ENVIRONMENT

(See App.5, Sec.1.3.)

1) Light readings on desks

In the CRs with max. positive attitudes we find on the desks more foot-candles than in CRs with min. positive attitudes.

On the other hand, however, with both max. & min. foot-candle readings, no appreciable difference in attitudes is recorded.

2) Light readings on chalkboards

In the case of 'Being' the higher the proportion of 'like' responses, the higher the light readings, & vice versa.

In the case of 'Remaining', the more the 'glad' responses, the higher the light readings, but the opposite is not true.

3) Responses to 'light on desks'

The higher the satisfaction with lighting, the more positive are the answers given to 'Being', & the more the students 'like being in their CR', the more satisfied they are with 'the lights on their desks'.

No consistent relationship is found in the case of 'Remaining'.

4) Responses to 'light on chalkboards'

Similarly, higher satisfaction with lighting is accompanied by more "like" responses to 'Being', & vice versa.

No consistent relationship is observed in the case of 'Remaining', indeed a slight inverse proportion is observed.

5) Responses to 'light in the CR'

As with the two previous cases, the more the children choose 'as it is' for the lighting, the more they 'like being in their CR', & vice versa.

Again, no significant differences occur in the case of 'Remaining'.

6) Total of 'As it is' responses given at the same time to the 3 cases of lighting

The same findings, as in each of the 3 cases of lighting hold true also in this case.

2.1.4. THE AURAL ENVIRONMENT

(See App.5, Sec.1.4.)

1) Responses to 'hearing the teachers'

The more the children hear 'very well' their teachers, the more they 'like being in their CR', & vice versa.

2) 'Very well' Responses to all 3 or 4 cases of 'hearing' ('the teachers', 'the others', 'the TV', 'the music')

Similarly, the better they hear, the more they 'like being in their CR', & vice versa.

No consistent relationship is found between student responses to 'acoustics' & their attitudes vis-à-vis 'remaining longer in school'.

2.2. TEACHERS

The teachers' attitudes are , in reality, not attitudes at all, but judgements of the adequacy of their CRs with respect to their teaching methods, & the physical health & the mental health of their students.

1) The Teaching Method (TM)

(See App.2, Sec.2.2.1.)

A little more than half the teachers find their CRs 'adequate' for their TMs, about one third find them 'barely adequate' & the remaining one eighth consider them 'inadequate'.

At the upper end of the scale, in 3 schools 100% of the teachers are satisfied with their CR, while at the lower end, in one school, as little as 15% only are satisfied.

2) The Physical Health (PH)

(See App.2 , Sec.2.2.2.)

About two thirds of the teachers consider their CR 'adequate' for the PH of their students, and the one third find them 'barely adequate'.

In 2 schools 100% of the teachers approve their CR, & in 1 school as little as 25% do so.

3) The Mental Health (MH)

(See App.2, Sec.2.2.3.)

Three quarters are satisfied with their CRs for the MH of their students, while one quarter consider them 'barely adequate'.

In 5 schools, 100% of the teachers rate their CR 'adequate', while in one school as little as 23% do so.

* It is interesting to note that the CRs are considered most satisfactory for the mental health, less satisfactory for the physical health & least satisfactory for the teaching method.

4) The totals of 'adequate' responses given at the same time to all 3 cases (See App.2 , Sec.2.2.4.).

Two fifths of the teachers find their CR 'adequate' for all 3 purposes, while a negligible proportion find them 'barely adequate' or 'inadequate'.

These ratings range from 90% in one case to 0% in another.

5) Mutual Effects of the Responses to TM, PH,MH

(See App.5 , Sec.2.0.)

When CRs are considered more 'adequate' for any one of the 3 purposes, they score also higher ratings for the 2 other purposes.

Thus, when the ratings for TM are highest, those for PH & MH are higher than when the ratings for TM are lowest. And so on.

There is a very strong relationship linking all 3 ratings together.

2.2.1. THE SPATIAL ENVIRONMENT

(See App.5 , Sec.2.1.)

1) Responses to 'Area'

The teachers' judgements concerning the adequacy of the CR for all 3 purposes, & their responses to the adequacy of the CR area exert mutual direct influences.

Thus, the more the area is considered 'adequate' the more the CR is 'adequate' for TM, for PH, & for MH. And vice versa.

The closest relationship is that between 'area' & 'teaching method'.

2) Responses to 'No. of Students'

Very much like the responses to the 'area', these responses too bear direct relationship with the adequacy of the CR for all 3 purposes.

The more the 'No. of students' is considered 'adequate', the more the 'adequate ' ratings for TM, PH & MH. And vice versa.

Again, the strongest effects are between 'no. of students' & 'teaching method'.

3) Responses to 'Storage'

Not as strong as in the case of 'area' & 'nO. of students', nevertheless there are close relationships also between the responses to 'storage area' in the CR & the ratings for the adequacy of the CR for the TM, PH & MH.

When the teachers are most satisfied with 'storage area', they give higher ratings to TM,PH & MH, than when they are least satisfied with it.

Again the strongest influences are between 'storage' & 'teaching method'.

* In all the above cases, i.e. 'Area', 'No.of students', & 'Storage', the total 'adequate' responses at the same time for all of TM, PH & MH show similar relationships with the spatial factors.

4) Responses to 'Windows'

There are direct but weaker relationships between some 'attitudes' & the teachers' responses to 'windows'.

Thus, the more the windows are considered 'adequate' the higher the adequacy of the CR for TM & MH (but not for PH, surprisingly) and vice versa.

As to the totals of 'adequate' answers for all 3 purposes together, no appreciable differences occur between schools with highest & schools with lowest ratings for the windows.

5) Grouping : Class Type

(See App.4 , Sec.2.2.3, No.6.)

Although the results show no significance, nevertheless it would be wise to note that CRs with operable partitions seem to satisfy the teachers more than CRs without or with fixed partitions, vis-à-vis the adequacy of the CR for the 3 purposes.

For TM, CRs with fixed partitions receive lowest ratings, for PH, equal to the ratings to operable partitions & for MH, nearly equal to these results.

However, on the whole, for all 3 purposes together, the 3 types of CRs are rated almost equally.

6) Comments

Questions about the adequacy of the CR for the 3 purposes, should have included a note requiring them to mention, in order of importance, the factors which induced the teachers to rate the CR 'adequate', etc..

However, even without that note, teachers have written down their reasons, which are given here & elsewhere in this thesis.

To the question about the adequacy of the CR for their TM, teachers in 28 schools have mentioned the lack of space as a hindrance to application of their methods, specifically to the activity methods. This complaint has come even from a school with an open plan & accordeon type partitions, i.e. designed for activity methods (but not used accordingly).

One teacher describes her CR as "wall to wall students". Another states that the biological needs of the child require that he be not confined to 3 ft. around the desk.

In 4 schools, teachers mention that the CR area is enough or adequate, while in 2 open-plan schools the "freedom of movement" is considered an advantage, while at the same time in one of them overcrowding is regarded as a disturbance for the "much needed quiet times".

One of the teachers asks for CRs of varying sizes, while another requirs an L-shaped room.

One teacher confesses that she had to "temper herself to the CR"...! Another states what many could have said-that, when the CR is overcrowded, it is impossible to pay each individual child the attention he needs.

The lack of space causes difficulties vis-à-vis the following: changing the type of activity, regrouping, rearranging desks to create special work areas, displays, quiet reading, discussions, moving around, dividing space (by desired portable dividers), formation of lines, etc..

In the responses to the same question, the lack of storage space as being detrimental to the teaching method is mentioned in 12 schools.

In their answers to the question about the adequacy of the CR for the PH of their students, teachers in 15 schools have mentioned the lack of space as being damaging, "Children are too cramped", "sit too close to each other", "colds spread too fast", "accidents happen", "physical activities & movement are restricted".

Only one teacher states that the CR has a very favorable space.

For the 3rd question , i.e. about the MH, teachers in 14 schools have seen the lack of space as creating the following inconveniences:

- cramping (trip over books,bags,each other),
- restriction of movement,
- impossibility of formation of small groups, difficulty of isolation,
- children sitting for too long periods,
- children comparing themselves with each other, teasing each other,
- repressing atmosphere.

2.2.2. THE THERMAL ENVIRONMENT

(See App.5, Sec.2.2.)

1) Responses to 'Thermal Atmosphere'

When teachers are most satisfied with the 'thermal atmosphere' of their CR, they rate highly the adequacy of the CR for TM & PH (not for MH). When they are least satisfied, the judgements for TM & PH are lower too. And vice versa.

On the whole, in the total of adequate answers for all 3 purposes, that relationship still holds true.

2) Responses to 'Ventilation'

In schools where more teachers find the 'ventilation' of the CR 'adequate', they also give high ratings to PH & MH (but mot necessarily to TM), & in schools where less teachers find the 'ventilation' 'adequate', they give low ratings for PH & MH. And vice versa.

These results are reflected also in the totals of 'adequate' responses to all 3 purposes.

3) Comments

Almost no mention is made of temperature & ventilation with respect to MH & no mention at all is made of them with respect to TM.

All comments, therefore, come under the question about the adequacy of the CR for the PH of the students.

In 10 schools teachers complain of the inconsistency of the thermal atmosphere, in 6 they find the air too dry, in 4 too hot in sunny weather, & in 2 too hot in winter.

Only in 4 schools there are positive remarks about temp., in two mentioning that it can be controlled, in one indicating that the floor is heated, & in another that there is "lots of sunshine".

As to ventilation, in 14 schools teachers consider it insufficient, in 3 they mention drafts & only in 6 they show satisfaction. In two schools they indicate that they can't open the windows, in one they ask for heated floors to enable the children to sit down, & in 2 schools complain that the carpet dries the air.

2.2.3. THE LUMINOUS ENVIRONMENT

(See App.5 , Sec.2.3.)

1) Responses to 'Lighting'

It is surprising to find that no clear relationship results between responses to 'lighting' & the judgements of the teachers about the adequacy of the CR for TM & PH.

As for the MH, there seems to be a certain direct relationship. When teachers are more satisfied with the 'Lighting' they rate their CR higher than when they are less satisfied.

2) Comments

Far less remarks are made about lighting than about therm. atm. (& there are less about therm. atm. than about the spatial environment). As it will be seen, there will be still fewer remarks about the aural atmosphere.

Thus, with respect to the TM, no mention is made of lighting.

With respect to the adequacy of the CR for the PH of the students, in 5 schools there are complaints about the inadequacy of lighting, in 3 schools there is satisfaction that the CRs are "bright", & in 2 that they are "well illuminated".

With respect to the adequacy of the CR for the MH of the students, in 3 schools satisfaction is observed & in 3 others dissatisfaction.

3) Responses to 'Colours'

Consistent relationships exist also between ratings for 'colours' & for TM, PH & MH (& their totals).

Thus, the more the colours are said to be 'adequate', the more the CRs are judged 'adequate' for the TM, PH & MH. And vice versa.

2.2.4. THE AURAL ENVIRONMENT

(See App.5, Sec.2.4.)

1) Responses to 'Acoustics'

Once again a direct & clear relationship is established between responses to 'Acoustics' & to the adequacy of the CR.

When teachers are most satisfied with the 'Acoustic' of their CR, they give high ratings to the adequacy of the CR for TM, PH, MH, & to all 3 together, & when they are least satisfied with the 'Acoustics', they give low rating to the adequacy of the CR. And vice versa.

2) Responses to 'Noise Reduction'

Exactly the same can be said for the responses to 'Noise Reduction'.

3) Comments

In 2 schools the inadequacy of the acoustics & the noise reduction are mentioned with respect to TM.

In 2 schools noise is considered "nerve-wrecking" & "distracting", vis-à-vis the PH, while in one school it is mentioned that carpets are excellent in sound reduction.

As to MH, the damaging effect of noise is mentioned in 3 schools.

2.2.5. THE TOTAL ENVIRONMENT

(See App.5, Sec.2.5.)

1. Totals of 'adequate' responses to all aspects of the environment

Here we shall consider the totals of 'adequate' responses to 9 to 12 of the following aspects of the environment:

- area
- no. of students
- storage
- windows
- colours
- thermal atmosphere
- ventilation
- lighting
- acoustics
- noise reduction
- materials
- equipment

The two last items are not considered in the analysis of the different aspects of the environment, but are included here since they were found in the questionnaire & have influenced one way or another the total ratings of the CRs.

Very much as expected, the more the 'adequate' answers to the environment, the higher the ratings for the adequacy of the CR for TM, PH & MH (& their totals), & the less the 'adequate' answers, the lower the ratings. And vice versa.

Therefore, a very strong relationship does exist between the responses to the environment & the 'attitudes' of the teachers as to TM, PH & MH.

2.3 STUDENTS AND TEACHERS COMPARED

(See App.5 , Sec.3.0.)

1) Responses to 'Being in the CR' by the students & the totals of teacher "attitudes"

This comparison is done just for its own sake, since it would not be very fair to ask so greatly differing questions to two separate groups, & then compare their responses. Nevertheless a certain relationship is seen.

Thus, the higher the teachers' ratings for all three purposes (TM,PH,MH), the more students 'like being in their CR', & the lower the ratings, the less students 'like being in their CR'.

Conversely, however, the relationship is too weak to be taken into account.

2.S. SUMMARIES

2.1. STUDENTS

(See graphs 2.1.) (& also 1.1.1.a.)

- While 2/3 of the students like to be in their CRs, only 1/16 would be glad to remain longer in school.
- There is a strong direct relationship between the two attitudes.
- Area & No. of Students in the CR affect inversely the attitudes of the children.
- Responses to 'Area' & attitudes are directly & mutually related.
- A slight mutual influence seems to exist between responses to 'thermal atm.' & students' attitudes.
- A slight mutual influence is also observed between responses to 'lights' & responses to 'being'.
- Responses to the 'Aural environment' are mutually, very strongly & directly related to the attitudes.

2.2. TEACHERS

(See graphs 2.2.) (& also 1.2.1.a.)

- The proportion of the teachers judging their CRs adequate increases from about half to two thirds to three quarters when they consider the adequacy for their teaching method, the physical health of the students & their mental health respectively.
- The judgements for the 3 factors are all strongly & directly related to each other.
- Each of the responses to 'Area', 'No. of students' & 'Storage' are mutually, directly & strongly related to the judgements of each of the 3 factors.
- Responses to the 'thermal atm.' of the CR & the judgements of the adequacy of the CRs for all 3 purposes together have strong & direct mutual influences.
- Similarly, there seem to be very strong mutual relationships between responses to the 'noise reduction' & the judgement of the teachers.
- As expected, the ratings of the total environment & the judgements are in mutual direct relationship.

2.3. STUDENTS & TEACHERS

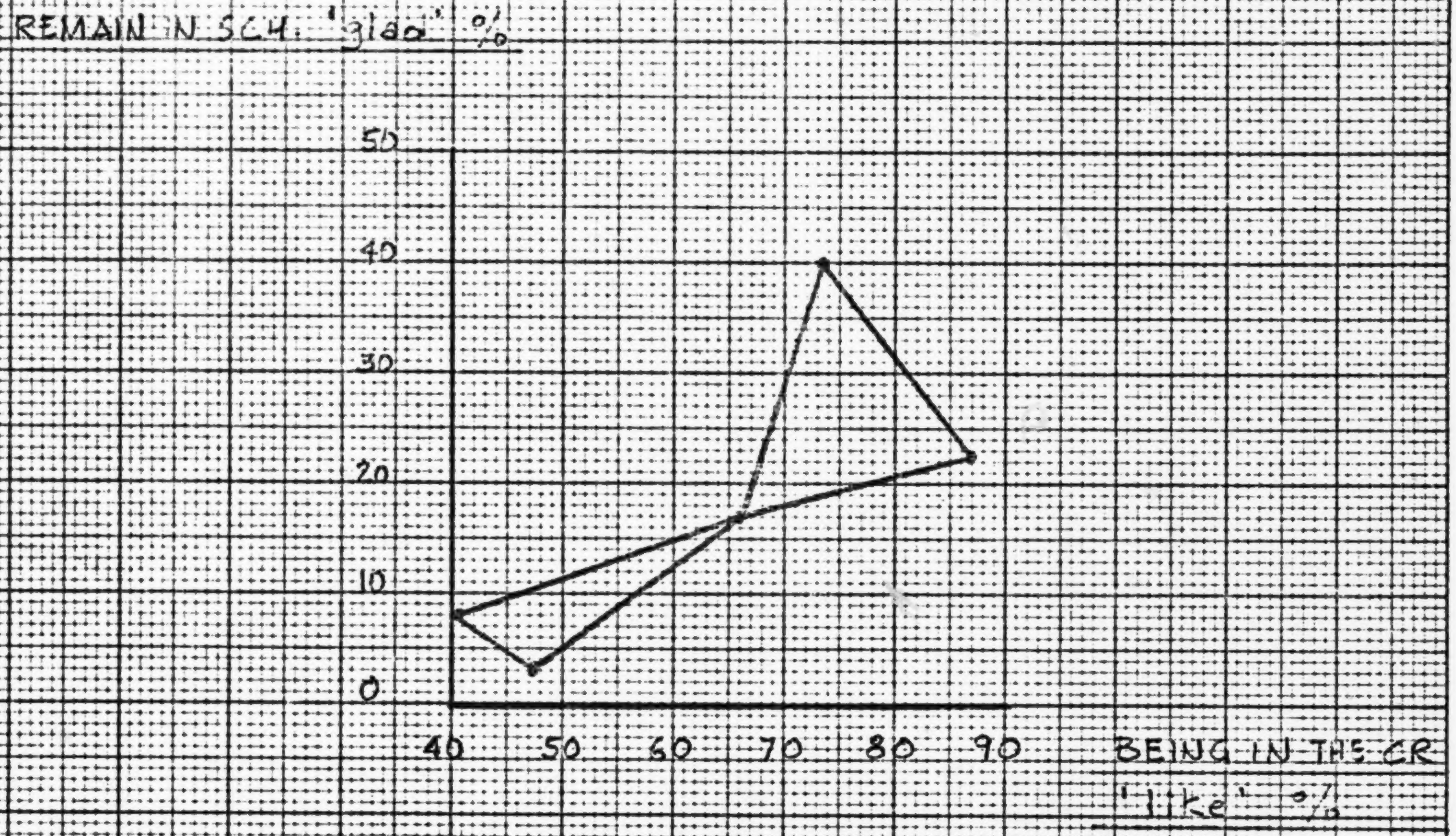
No clear & strong relationships have been observed between students' attitudes & teachers' judgements.

2.G.
GRAPHS

2.1. STUDENTS

2.1.0. ATTITUDES

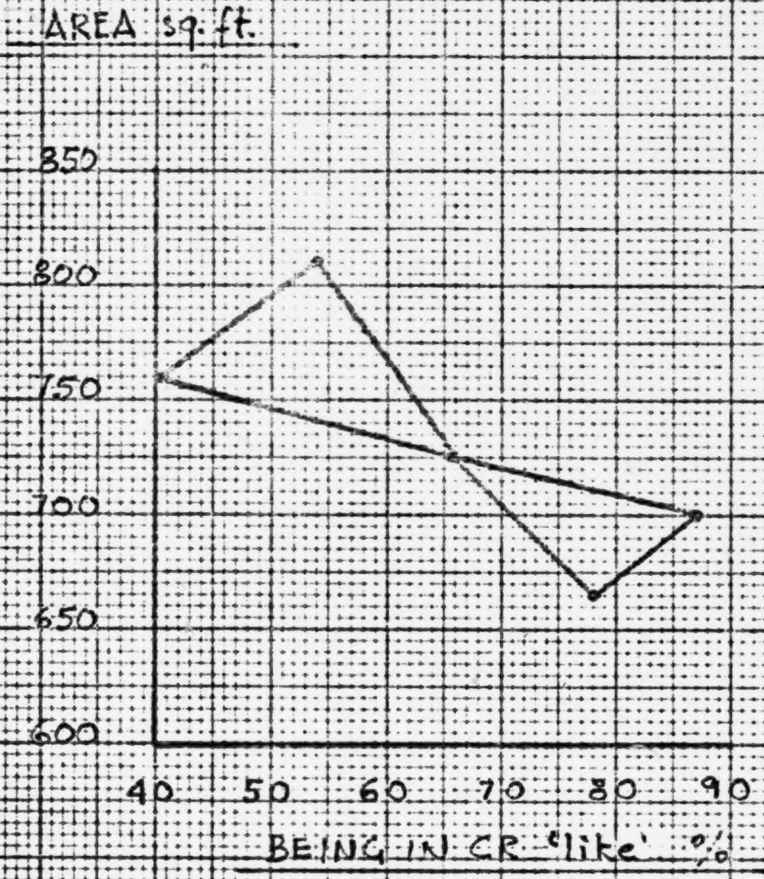
(See App. 5 Sec. 1.0.)

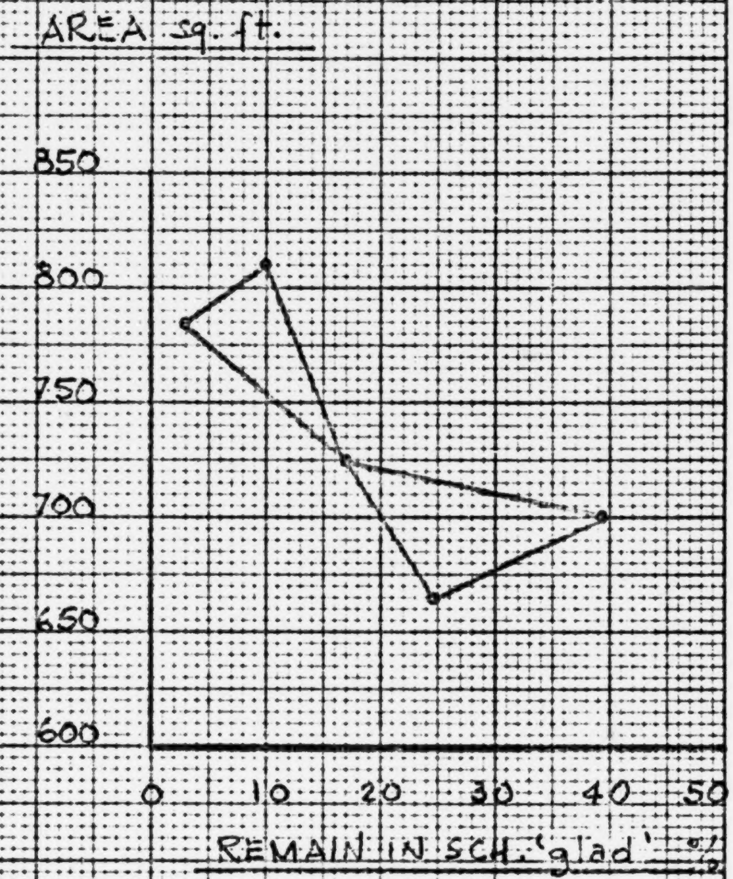


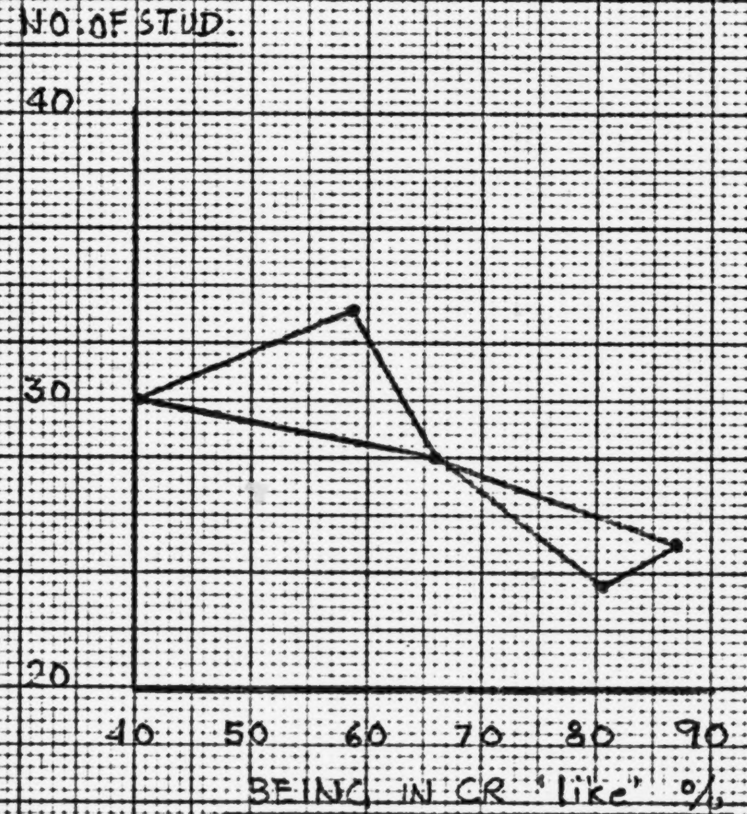
GRAPHS

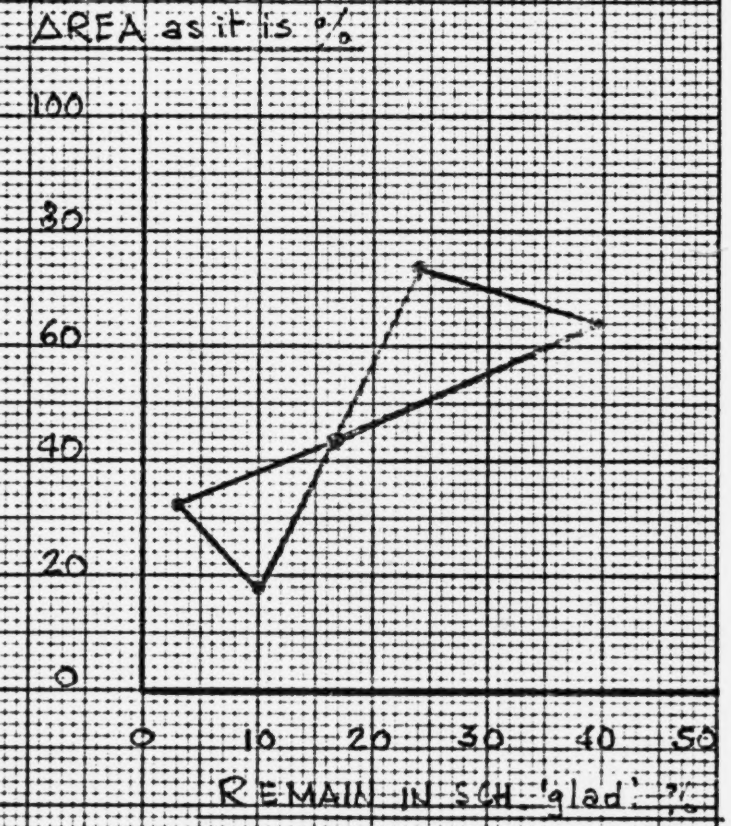
2.1.1. THE SPATIAL ENVIRONMENT

(See App. 5 _ Sec. 1.1.)





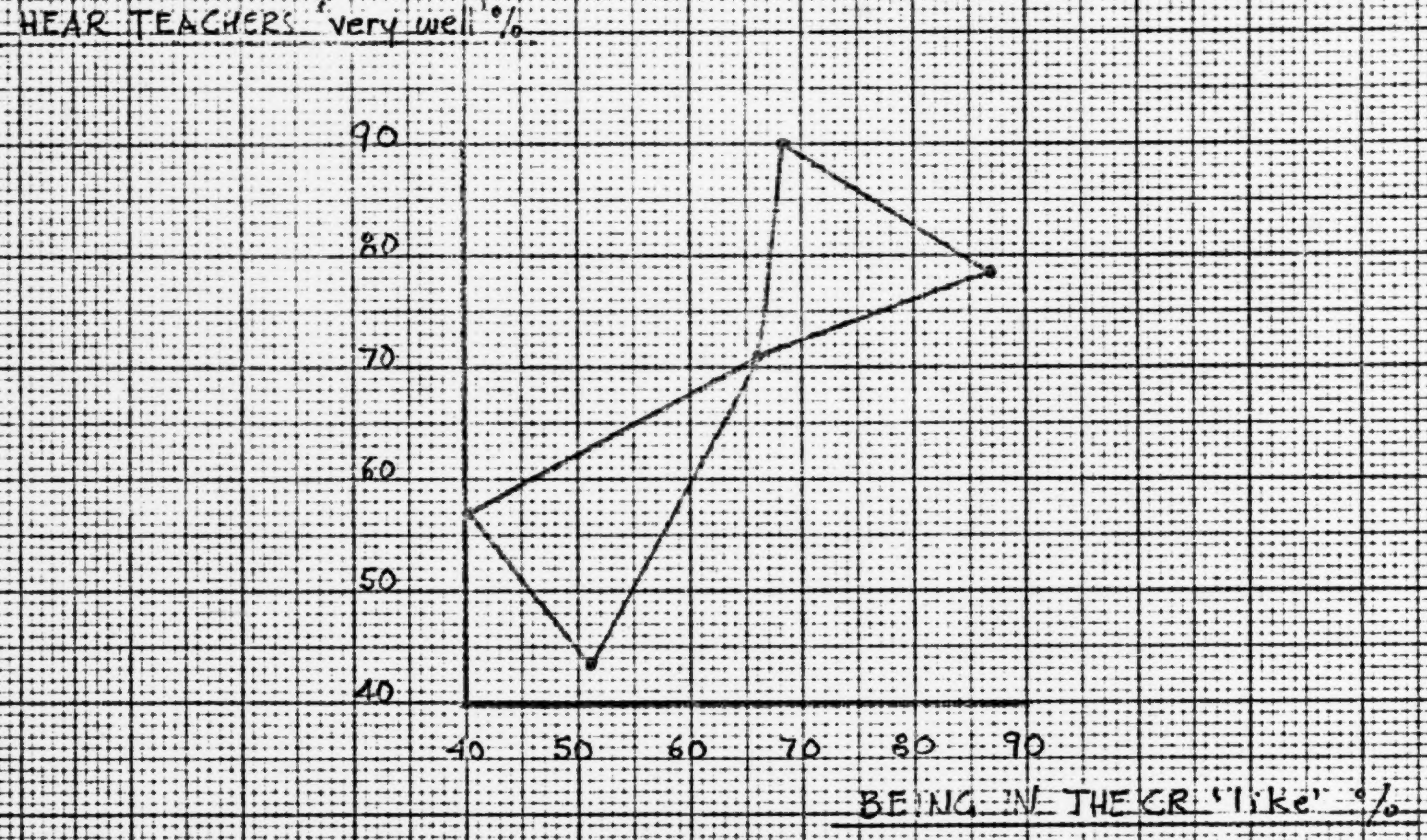


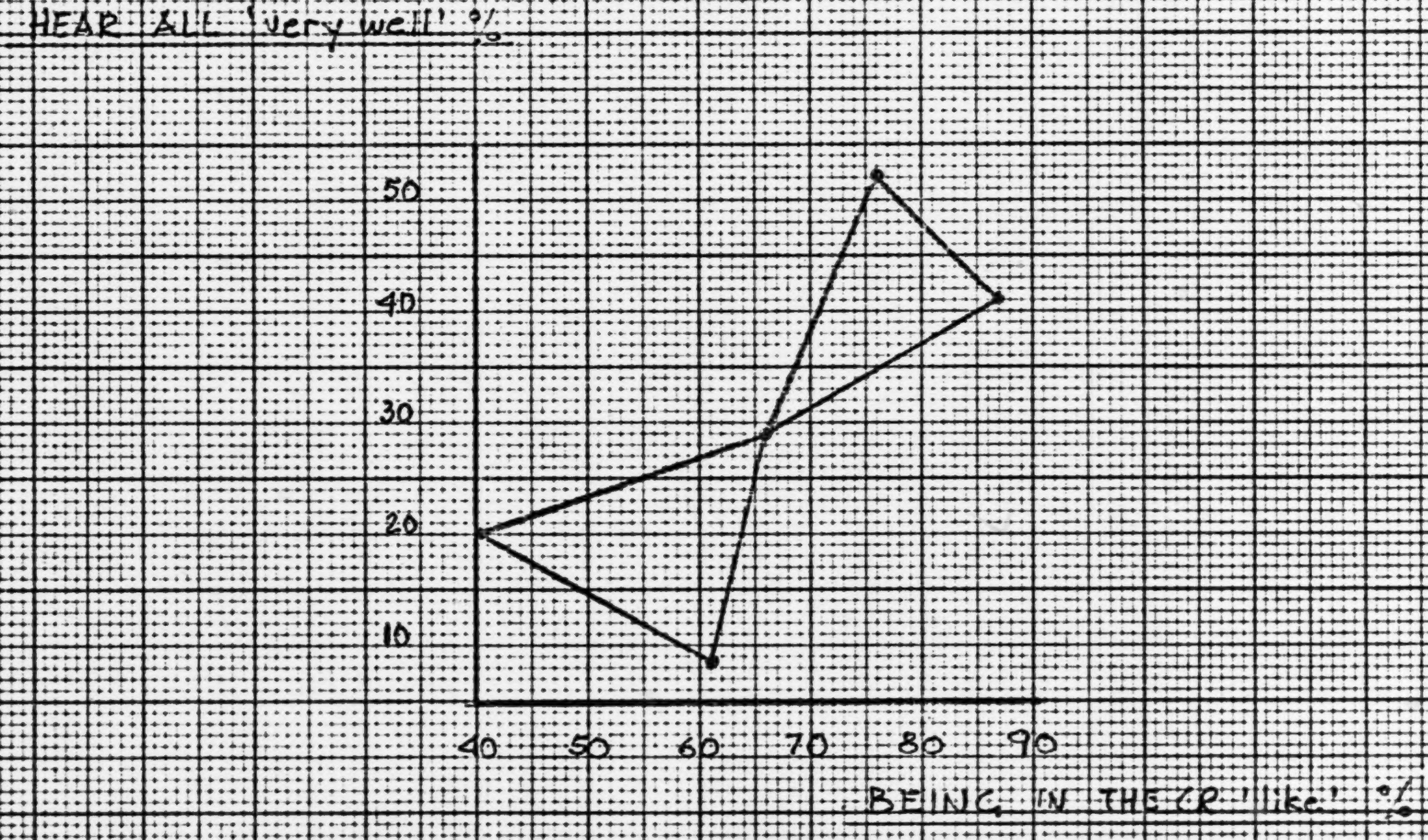


GRAPHS

2.1.4. THE AURAL ENVIRONMENT

(See App. 5 - Sec. 1.4.)

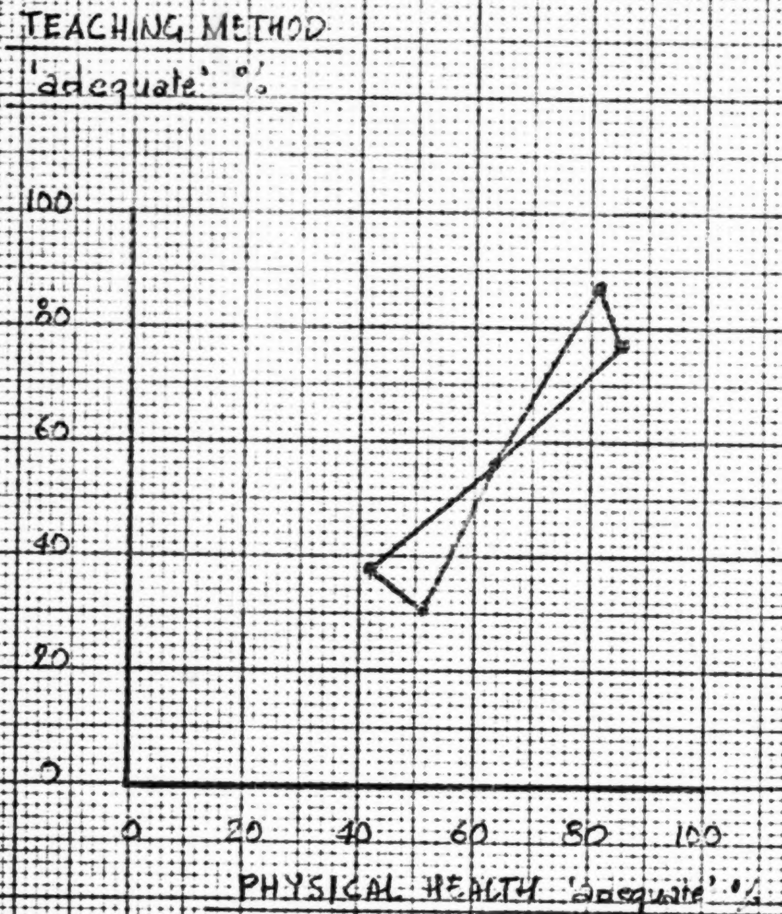


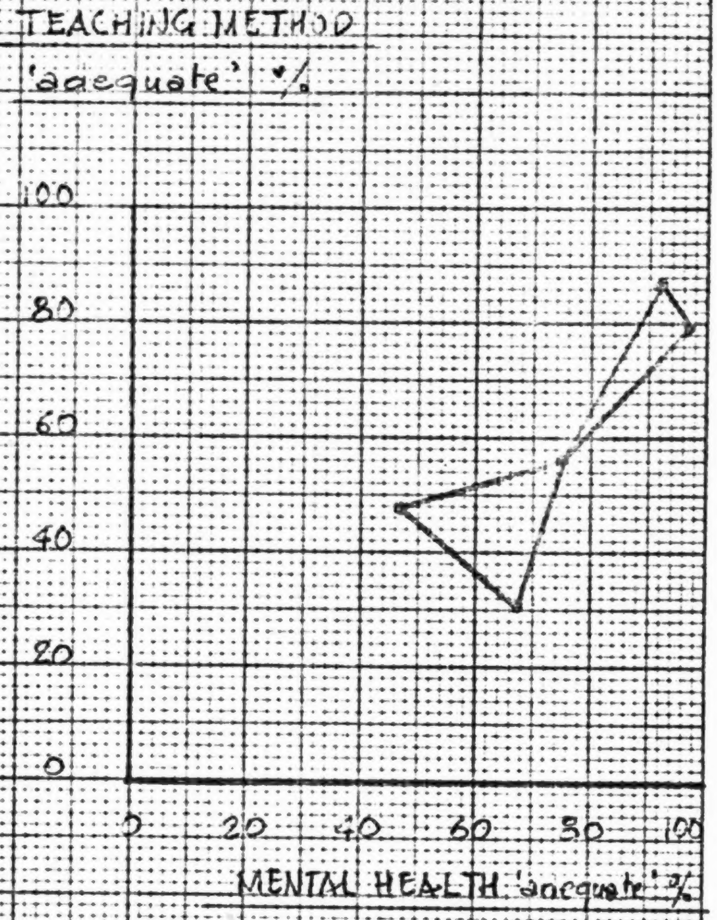


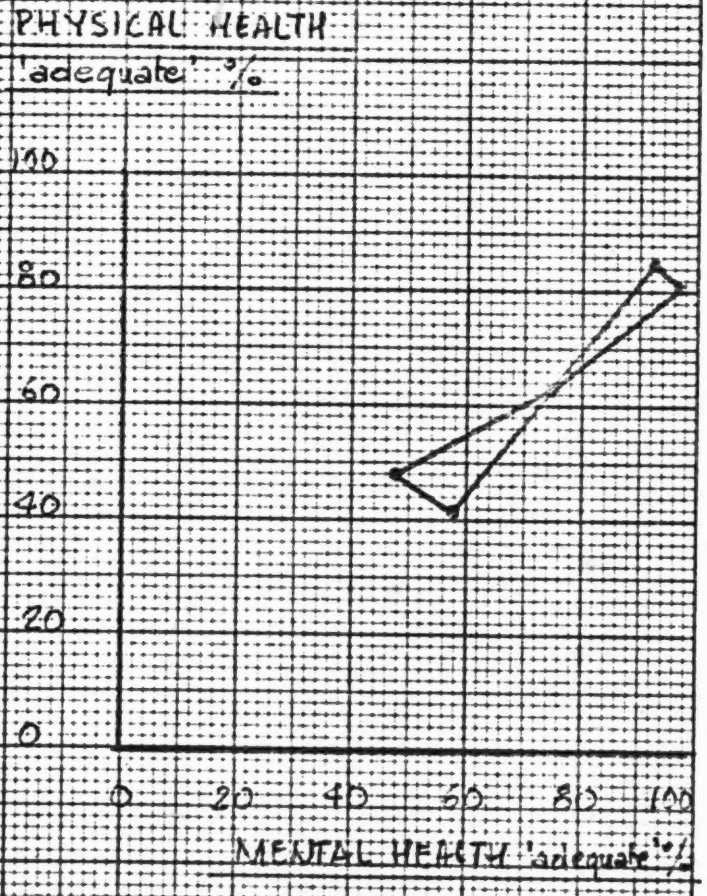
2.2. TEACHERS

2.2.0. ATTITUDES

(See App. 5 Sec. 2.0)

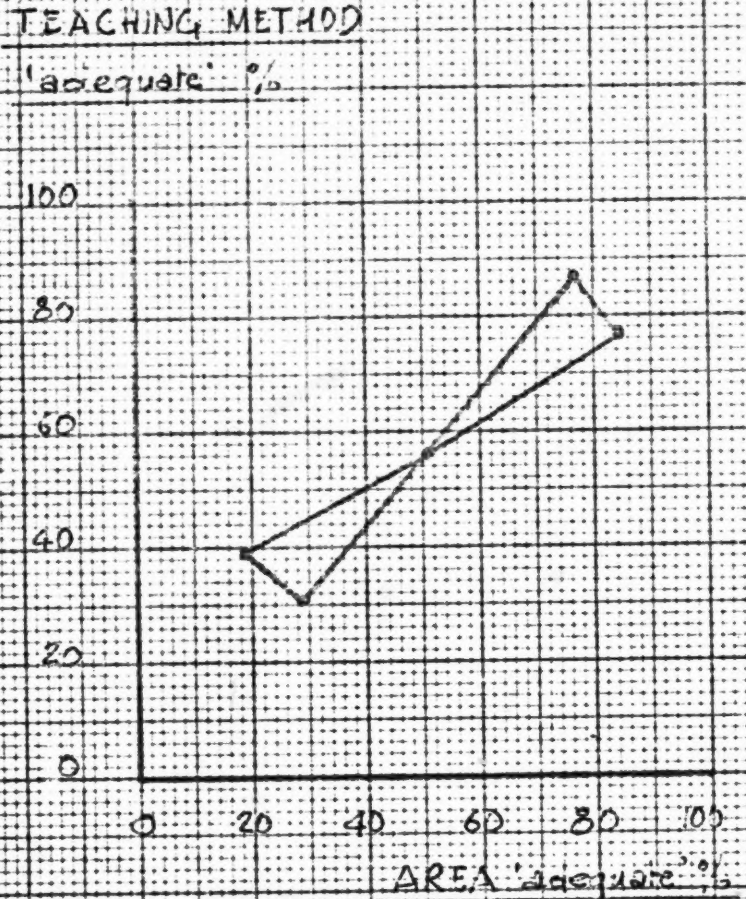


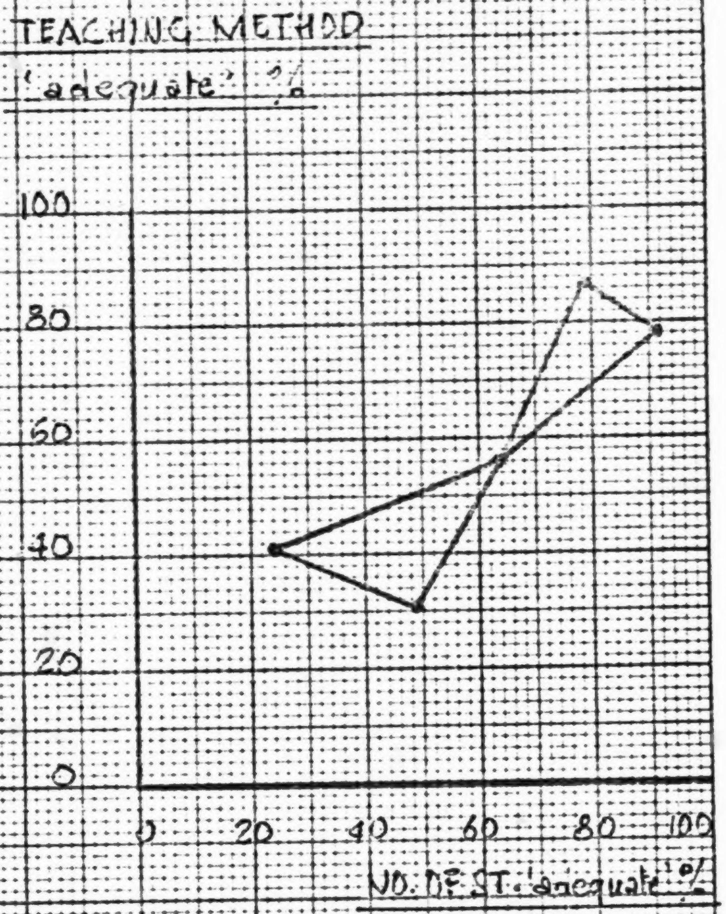


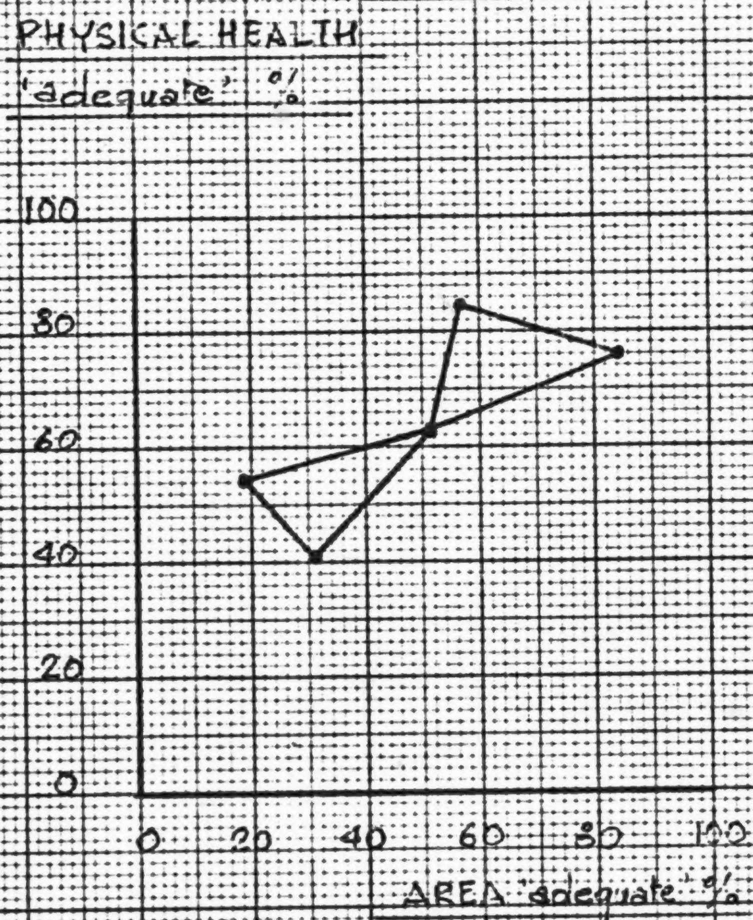


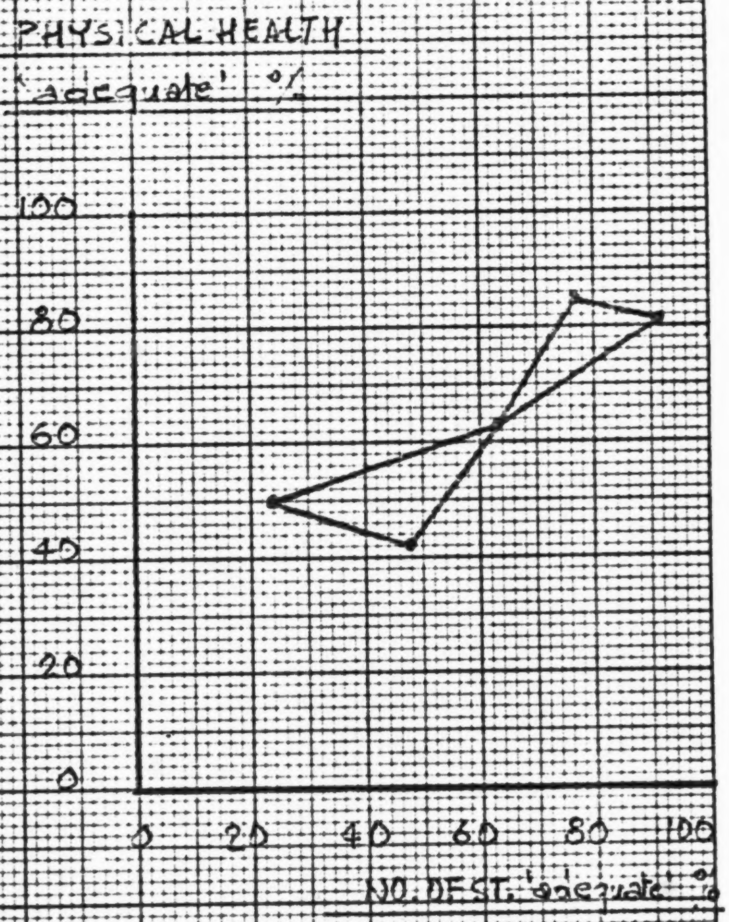
2.2.1. THE SPATIAL ENVIRONMENT

(See App. 5 - Sec. 2.1.)



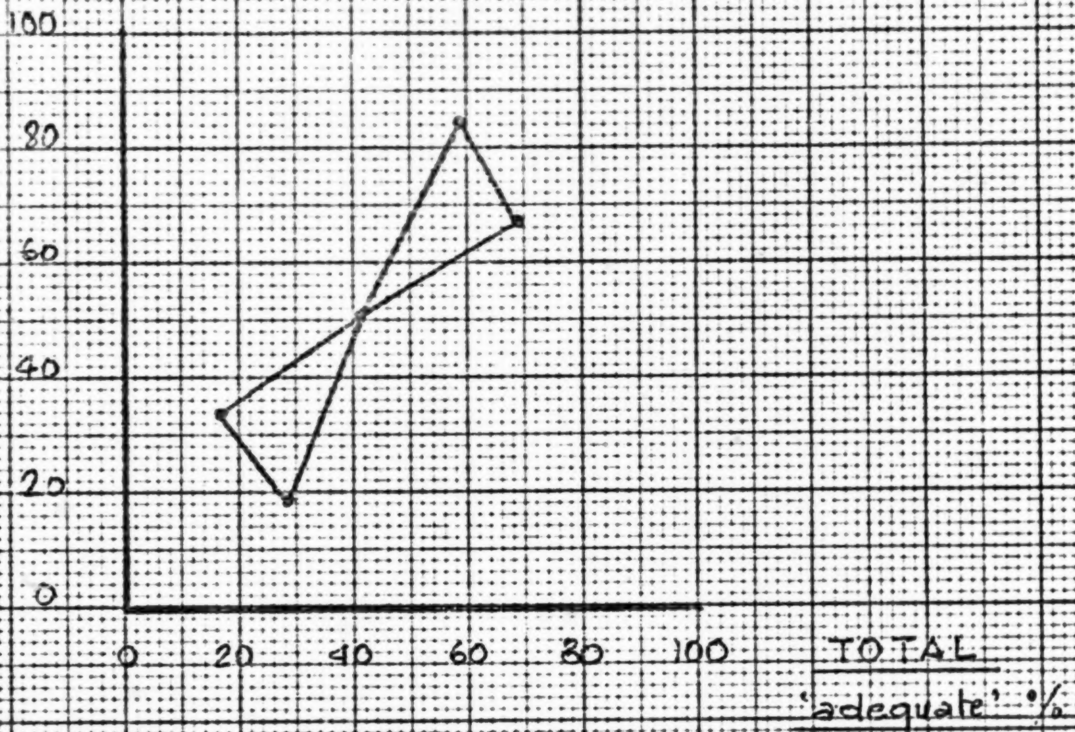




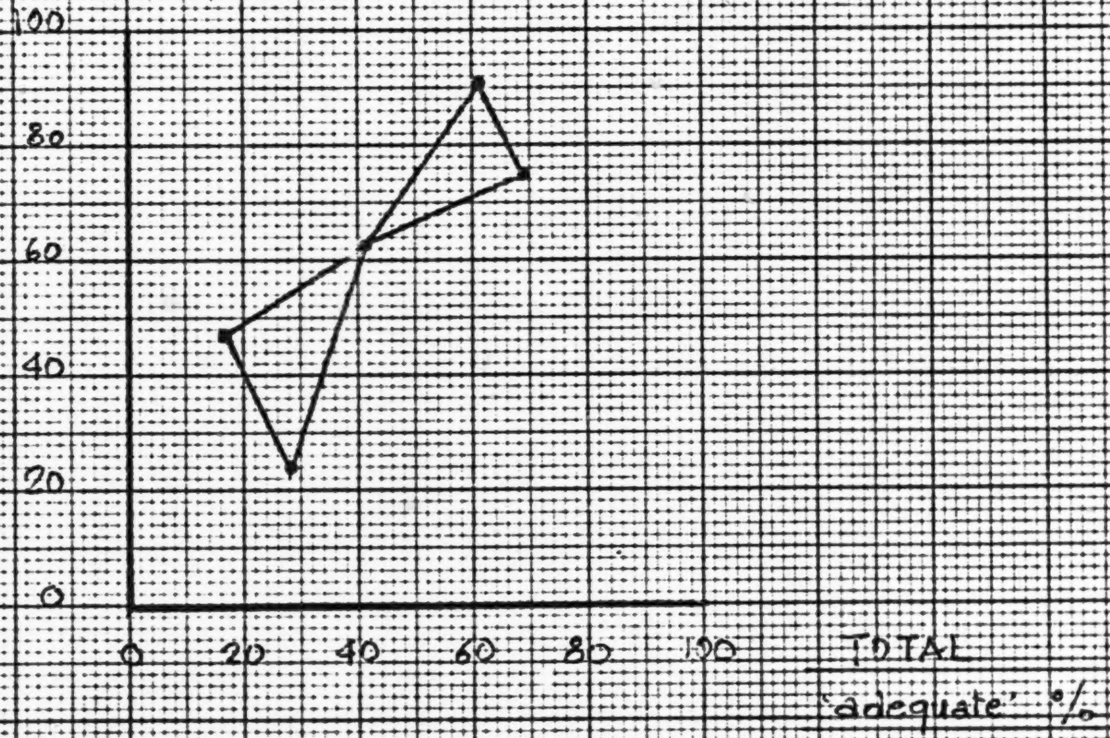


2.2.1. THE SPATIAL ENVIRONMENT (cont.)

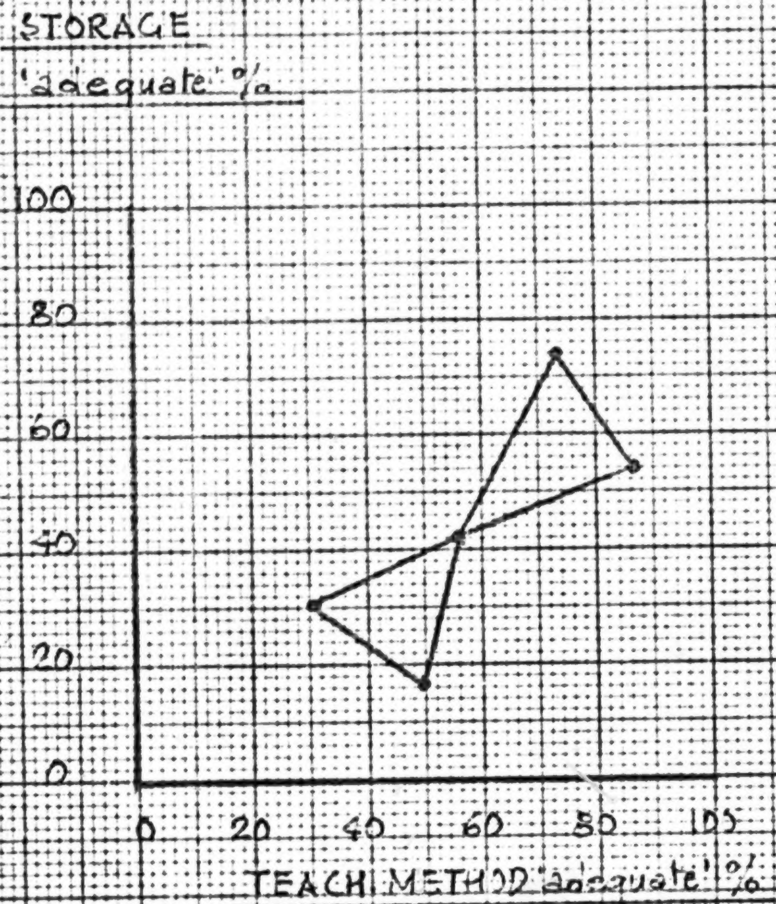
AREA 'adequate' %

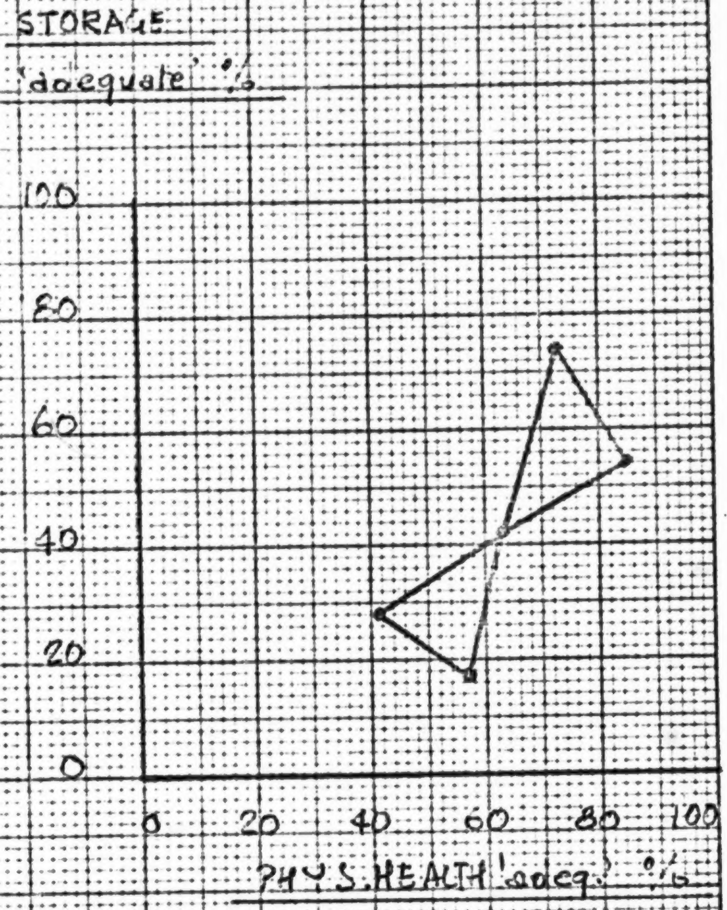


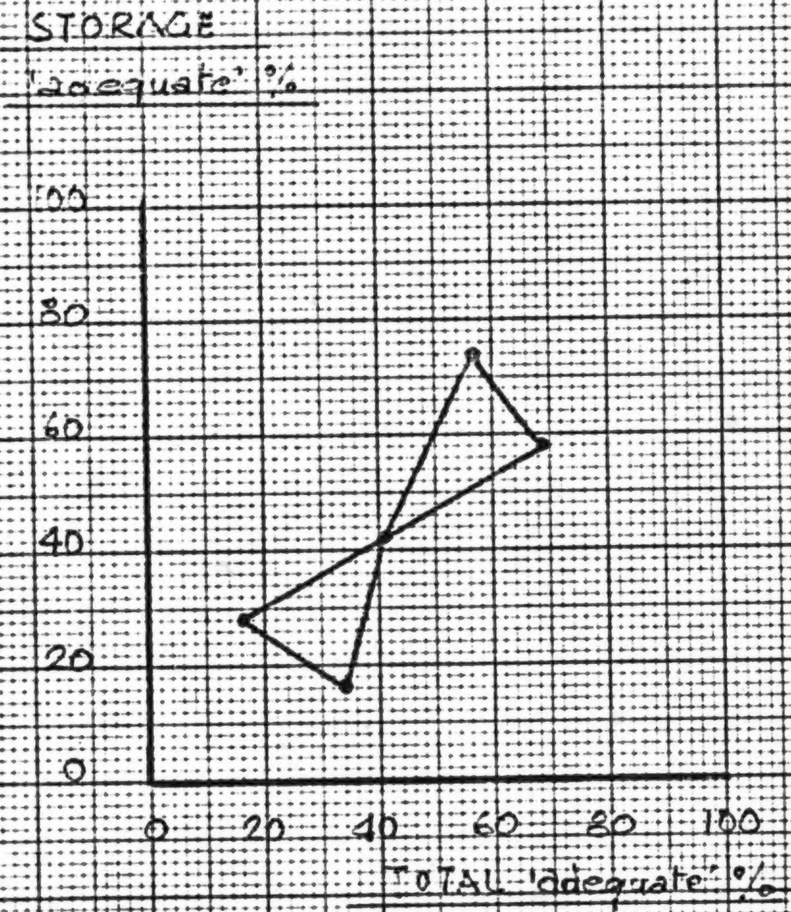
NO OF STUDENTS 'adequate' %



2.2.1. THE SPATIAL ENVIRONMENT (cont.)



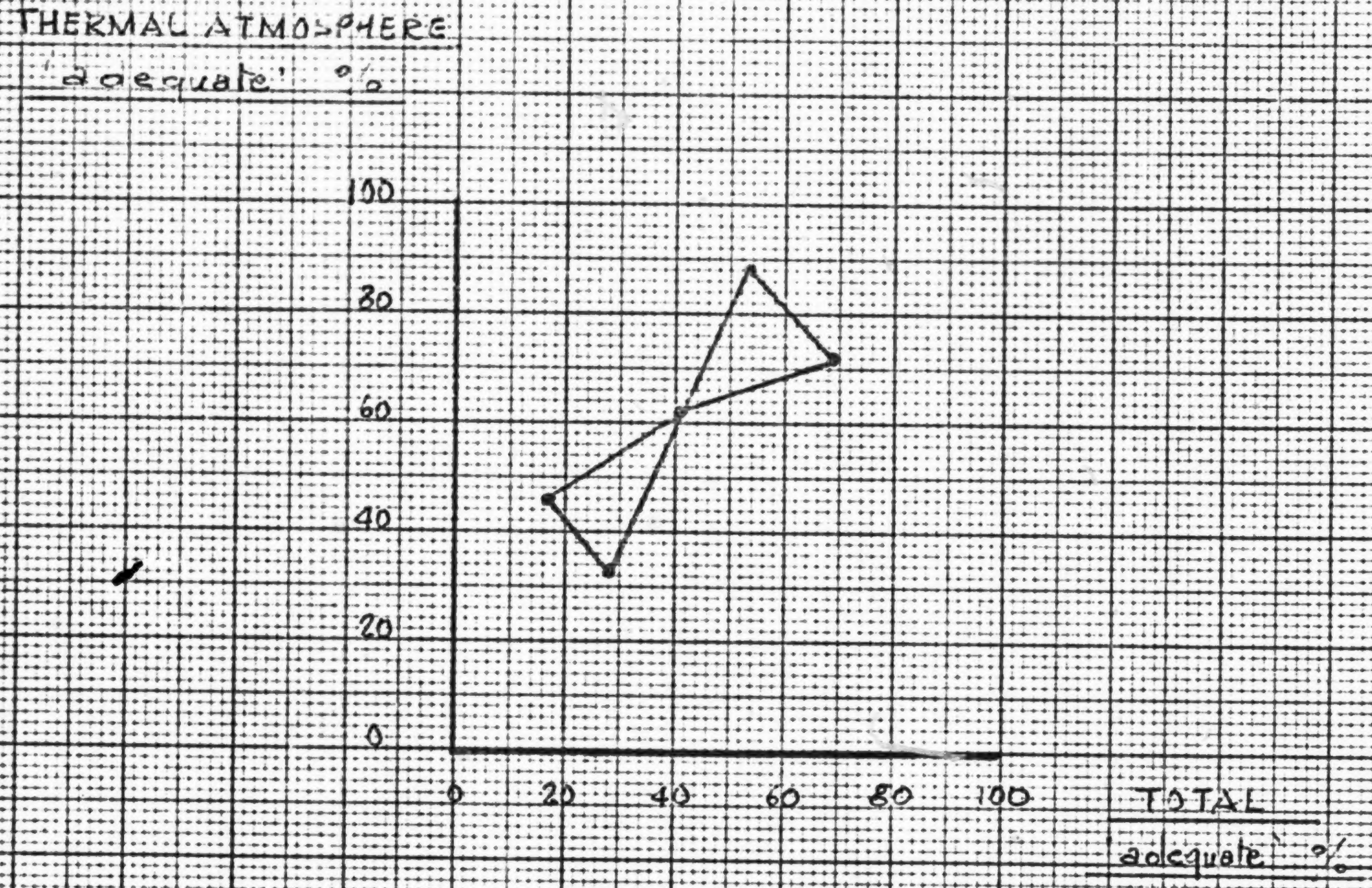




GRAPHS

2.2.2. THE THERMAL ENVIRONMENT

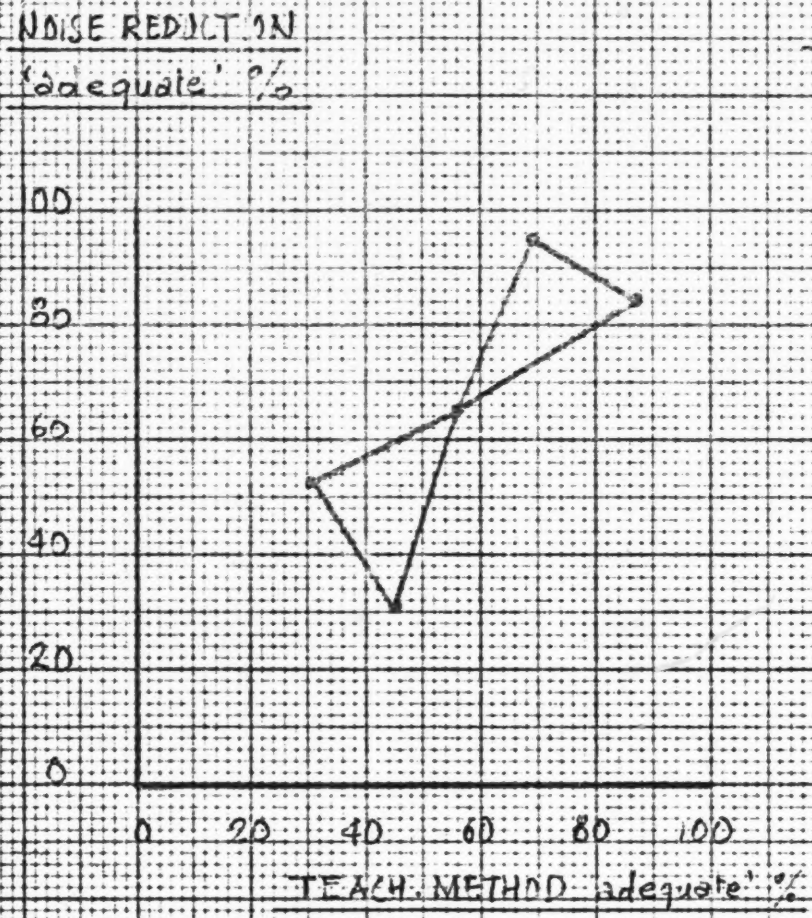
(See App. 5 - Sec. 2.2.)

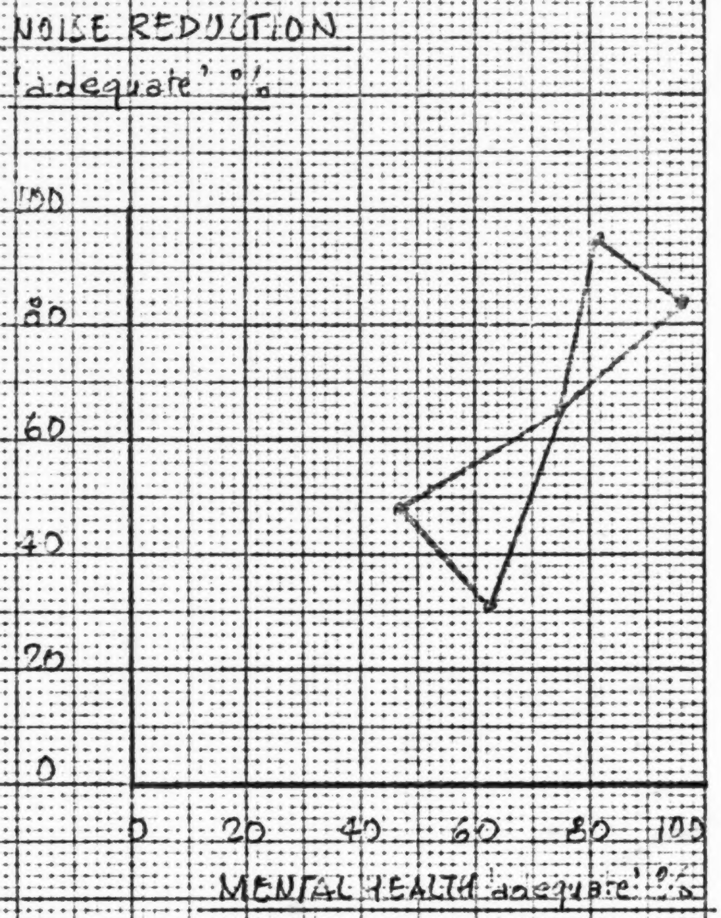


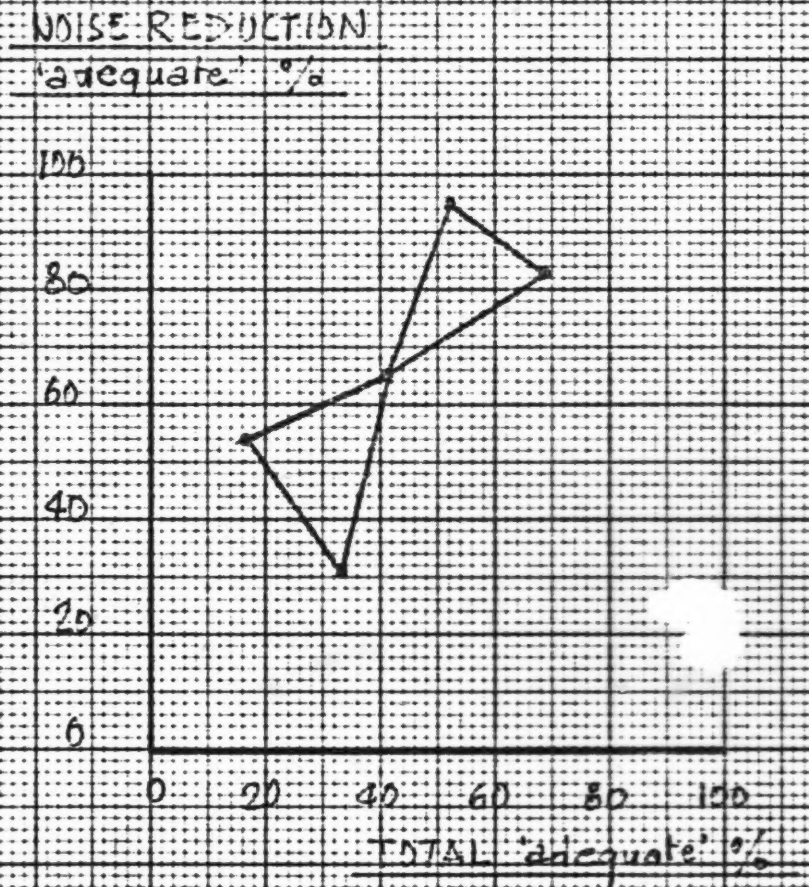
GRAPHS

2.2.4. THE AURAL ENVIRONMENT

(See App. 5 - Sec. 2.4.)



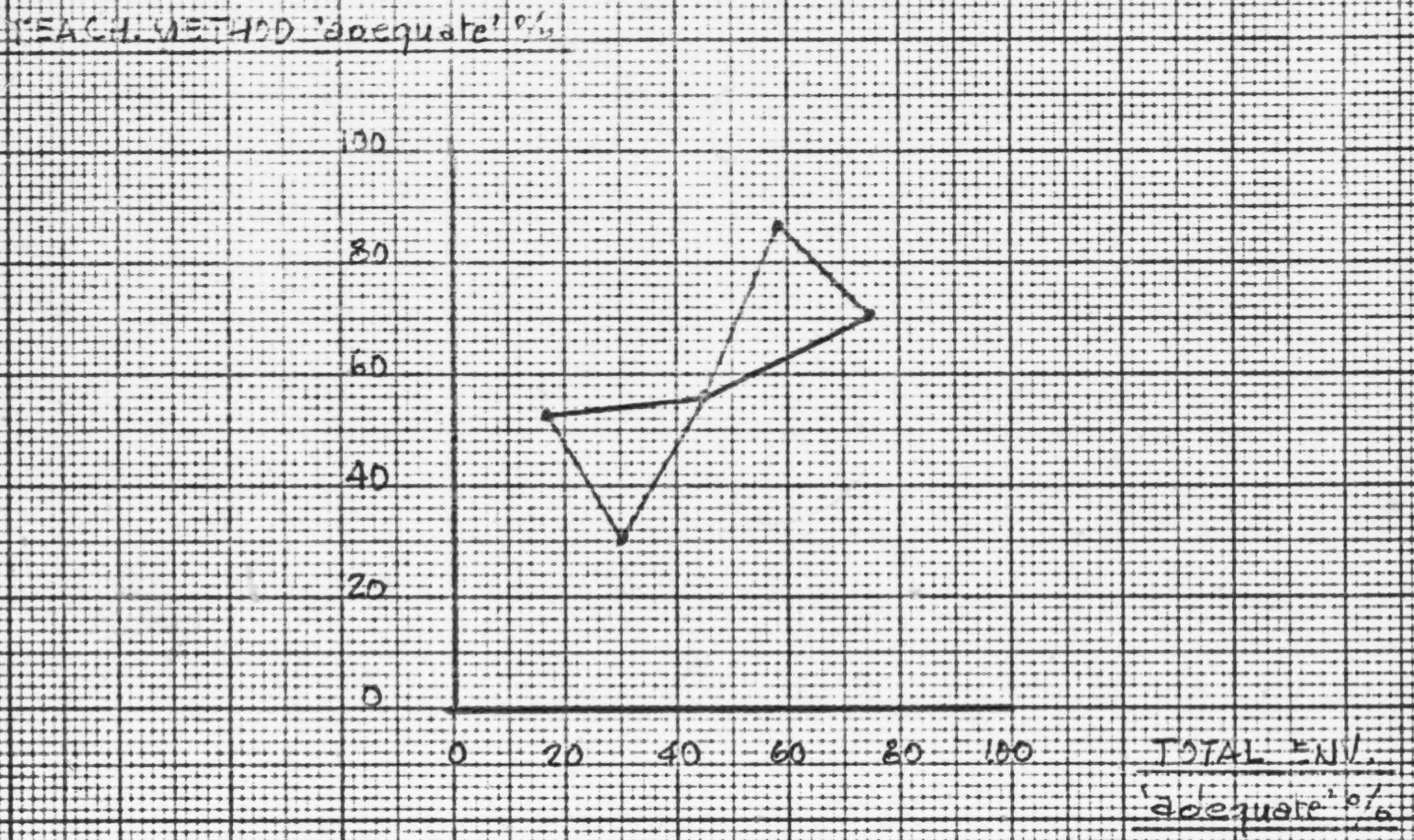


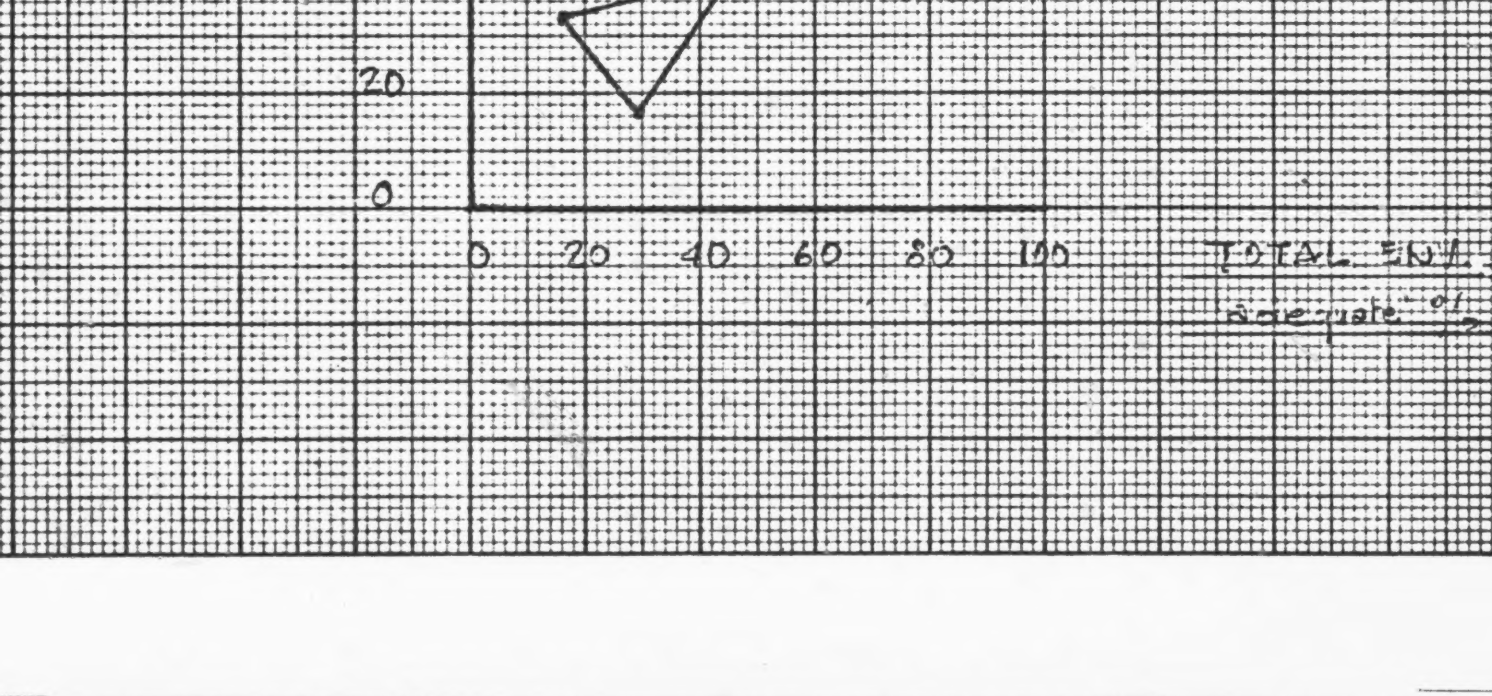


GRAPHS

2.2.5. THE TOTAL ENVIRONMENT

(See App. 5 _ Sec. 2.5)





2.C. CONCLUSIONS

While one cannot state decisively that the attitudes & the judgements are the direct result of the influences of the physical environment,(since there are psycho-sociological, as well as physiological factors which are not considered here but which undoubtedly colour the dispositions of the students & the teachers),one cannot deny however, that in one way or another both the students & the teachers are under subtle environmental influences & these are very well reflected in their responses to 'Attitudes'. It is outside the scope of this thesis to determine whether environmental satisfactions are the cause & the attitudes are the result, or vice versa. Perhaps both act together.

Student attitudes are very positive with respect to being in the CR, but very negative with respect to remaining longer in school.

The strongest relationship the students' attitudes have is with their responses to the aural environment, then the spatial environment. The weakest with those to the thermal environment. Actual area & number of students in the CR too exert very strong effects on the responses.

Teachers are most critical of the adequacy of the CR with respect to their teaching method, but less so with respect to the physical health of the students, & the least with respect to their mental health.

It is the responses to the spatial environment which have the strongest relationship with the teachers' attitudes, followed by the aural environment. The weakest relationship is with the responses to the luminous environment.

We can certainly conclude that, the higher the satisfaction with the environmental factors, the more positive are the attitudes, and the more positive the attitudes, the higher are the environmental satisfactions.

PART THREE

CULTURAL, SOCIAL AND OTHER FACTORS

Now, let us consider the various groupings formed according to cultural, social and other differences. We can compare the language groups (English speaking & French speaking), the income level groups (Lower, Lower Middle, Middle & Upper), the location groups (Urban, Semi-Urban & Suburban), the children's age groups (Grade VI & Grade VII), and the school building age groups (Opening Year:1951-56,1957-62, 1963-68, etc.). (See App. 6, Sec.1)

3.1. LANGUAGE

(See App.6, Sec. 1.1.)

3.1.1. THE SPATIAL ENVIRONMENT

1. STUDENTS (See App.6 , Sec. 2.1.1, No. 1)

Children in French Schools are more satisfied with their CR area, than children in English Schools. This difference may be the result of the following:

a) There are smaller Cr areas in Fr. schools than in Eng.ones. (In this study it was previously established that children in smaller rooms accept their CR areas more readily than those in larger rooms).

However, upon verification it is found that in the 6 largest Eng. CRs (ave.area 810 sq.ft), 35.25% of the children like the area 'as it is', while in the 6 largest Fr. CRs (ave.area 750 sq. ft), 50.50% do so. Even more significant are the proportions in the 4 smallest Eng. & the 4 smallest Fr. CRs (both ave. area 665 sq.ft). The Eng. are satisfied by 44.75%, the Fr. by 54.50%.

Therefore, actual area alone cannot account for the difference between Eng. & Fr. students' responses to their CR 'Area'.

b) There are fewer students in the Fr. Crs than in the Eng. ones. (It was found that a greater satisfaction with the area results from the decrease of the CR enrollment).

However, that difference is not so great as to cause the variation between Eng. & Fr. responses. Moreover, in each of the three categories of No. of students/CR, Fr. students are found to express more satisfaction with the area than Eng. students.

Therefore, actual number of students in the CR also cannot account by itself for the variations between the two ethnic groups.

c) Certainly those differences cannot be due to area per student in the CR, since Eng. CRs have a slightly larger area/st. than Fr. CRs, while it was found that more area per student evokes a higher satisfaction.

* Therefore the variations may be due to ethnic proxemic differences.

2. TEACHERS (See App.6, Sec.2.2.1, No.1.)

Fr. teachers, like Fr. students, are more satisfied with the area of their CR, & with the number of students within, than Eng. teachers.

No significant differences are recorded vis-a-vis 'storage' & 'windows'.

3.1.2. THE THERMAL ENVIRONMENT

1. STUDENTS (See App.6, Sec.2.1.1, No.2.)

A non-significant difference is found in favor of the Fr. students.

2. TEACHERS (See App.6, Sec. 2.2.1, No.2.)

English teachers are more satisfied than French teachers with both the thermal atmosphere & the ventilation of their CRs. This may be explained by the fact that generally Eng. CRs have larger areas than the Fr., & it was found that teachers in larger CRs were more satisfied with the thermal environment than teachers in smaller CRs.

3.1.3. THE LUMINOUS ENVIRONMENT

1. STUDENTS (See App. 6, Sec. 2.1.1, No.3.)

Surprisingly enough, Eng. students are more satisfied with the lights in their CRs than Fr. students, & this despite the existence of much higher luminous intensities in Fr. than in Eng. CRs.

Another paradox is that the Fr. are more satisfied with the area of the CR, while it was found that satisfaction with area corresponds to satisfaction with lighting.

Similarly, there are differences between Eng. & Fr. students with respect to their colour preferences.

The colour the Eng. like the most is light blue, while that of the Fr. is white, & the colour they both dislike the most is dark red.(See App. 6 Sec. 3).

2. TEACHERS (See App.6, Sec. 2.2.1, No.3.)

No variations are found between Eng. & Fr. teachers, either in light or in colour appreciations.

3.1.4. THE AURAL ENVIRONMENT

1. STUDENTS (See App.6, Sec. 2.1.1, No.4.)

2. TEACHERS (See App. 6, Sec. 2.2.1, No. 4.)

No significant variations are recorded in either case.

3.1.5. ATTITUDES

1. STUDENTS (See App.6, Sec. 2.1.1, No.5.)

A significant difference between Fr. & Eng. students is that more Fr. students than Eng. students like being in their CRs, & are glad to remain longer in school.

These correspond to the results about the area of the CR, but contradict those about the lighting.

2. TEACHERS (See App.6, Sec. 2.2.1, No.6.)

Teachers in Fr. schools are more satisfied with the CRs than teachers in Eng. schools vis-à-vis their teaching method &

the mental health of their students. As to the adequacy of the CRs for the physical health of their students both Eng. & Fr. teachers show equal satisfaction.

3.2 INCOME LEVEL

(See App. 6, Sec. 1.2.)

3.2.1. THE SPATIAL ENVIRONMENT

1. STUDENTS (See App.6, Sec. 2.1.2, No.1.)

No significant variations are noted between the students of different income level districts. However, the lower income level students show a slight advantage over the rest, & this may be due to all 4 schools in that level being Fr.

2. TEACHERS (See App.6, Sec.2.2.2, No.1.)

The significant variations are so irregular that it would be difficult to discern a certain pattern & arrive at consistent conclusions.

3.2.2. THE THERMAL ENVIRONMENT

1. STUDENTS (See App.6, Sec. 2.1.2, No.2.)

The middle and the lower income level students show more satisfaction with the thermal atmosphere than do the others. Neither the effective temperatures nor the CR areas can account for these variations.

2. TEACHERS (See App.6, Sec. 2.2.2, No.2.)

In this case the highest ratings of 'thermal atmosphere' & of 'ventilation' are given by the lower middle income level district teachers.

As teachers in the larger CRs had expressed more satisfaction with the thermal environment, & as the lower middle income level CRs have the largest areas (ave.740 sq. ft.), this may explain that variation.

3.2.3. THE LUMINOUS ENVIRONMENT

1. STUDENTS (See App.6, Sec.2.1.2, No.3.)

Students in the middle income districts are the most satisfied with the 'lights on the desks', 'on the chalkboards' & 'in the CRs'.

2. TEACHERS (See App.6, Sec. 2.2.2, No.3.)

No statistical significance is inferred from their responses, but here too the teachers in the middle income districts show the highest satisfaction.

3.2.4. THE AURAL ENVIRONMENT

1. STUDENTS (See App. 6, Sec. 2.1.2, No.4.)

No significant variations occur.

2. TEACHERS (See App.6, Sec 2.2.2, No.4.)

Both in the case of 'acoustics' & of 'noise reduction', the most satisfied teachers are those in the lower income level districts.

3.2.5. ATTITUDES

1. STUDENTS (See App.6, Sec.2.1.2, No.5.)

The children in the lower income level districts are the ones who, most of all, like being in their CRs, & who also like remaining in school longer.

Although the environmental factors & the attitudes, as we have already seen, bear close relationships, these results contradict those of the thermal & luminous environments. But considering the students who would like being in their CR, or/and remaining longer in school, & who have also replied 'as it is' to 'Area' & to 'Temp.', we find that the max. positive responses occur in the lower income districts.

2. TEACHERS (See App. 6, Sec. 2.2.2, No.6.)

No significant differences are recorded.

3.3 LOCATION

(See App.6 , Sec. 1.3.)

3.3.1. THE SPATIAL ENVIRONMENT

1. STUDENTS (See App.6 , Sec. 2.1.3, No.1.)

No significant differences are observed.

2. TEACHERS (See App.6 , Sec.2.2.3, No.1.)

Teachers in urban & semi-urban schools give higher ratings than teachers in suburban schools to all aspects of the spatial environment. Indeed, this bears a direct relationship to the area of the CRs. These areas are smaller in the suburban than the other schools. The paradox is that teachers in larger CRs do not show higher satisfaction than those in smaller CRs.

3.3.2 THE THERMAL ENVIRONMENT

1. STUDENTS (See App.6 , Sec 2.1.3, No.2.)

No differences, which are statistically significant can be observed, but the tendency is for lower satisfactions by suburban children.

2. TEACHERS (See App.6, Sec. 2.2.3, No.2.)

No observable differences.

3.3.3. THE LUMINOUS ENVIRONMENT

1. STUDENTS (See App. 6 , Sec. 2.1.3, No.3.)

In this case, it is the children in the semi-urban & suburban schools who are more satisfied than those in the urban locations.

2. TEACHERS (See App.6 , Sec.2.2.3, No.3.)

The teachers show no differences due to location.

3.3.4. THE AURAL ENVIRONMENT

1. STUDENTS (See App.6 , Sec. 2.1.3, No.4.)

No significant differences are shown.

2. TEACHERS (See App.6, Sec.2.2.3, No.4.)

Teachers in the urban & not in the suburban schools show the highest satisfaction, in spite of the noisier environment of urban areas.

3.3.5. ATTITUDES

1. STUDENTS (See App.6 , Sec. 2.1.3, No.5.)

Children in the semi-urban schools show least positive attitudes both in 'being in the CRs' & in 'remaining longer in school', while the children in urban or suburban locations show equally high positive attitudes. This is in complete contradiction to the findings about the environmental factors.

2. TEACHERS (See App.6 , Sec. 2.2.3, No.6.)

They are more consistent than the students. As they had shown least satisfaction with the environmental factors in the suburban areas, in their judgements about the adequacy of the CRs for their 'teaching method', & their students' 'physical health' & 'mental health', they give least positive responses in the suburban schools.

3.4. GRADE *

(See App.6 , Sec. 1.4.)

1. STUDENTS (See App.6, Sec. 2.1.4.)

Whether students are in VIth grade or VIIth seems to make no difference in their evaluations & attitudes, except in one case, i.e. that of temperature, when the VIIth graders show higher satisfaction.

---

* If teachers were asked to indicate the grade they teach, their different responses too could be categorized accordingly, & perhaps show up some interesting points.

3.5. OPENING YEAR

(See App.6 , Sec.1.5.)

3.5.1. THE SPATIAL ENVIRONMENT

In the span of 18 years (1951-1968), during which the 32 schools of this study are built, the areas allotted to the CRs have been decreased: in the schools built between

-1951 - 1959	the average	CR	area	is	755	sq. ft.
-1960 - 1968	" "	"	"	"	705	" "
-1963 - 1968	" "	"	"	"	700	" "
-1966 - 1968	" "	"	"	"	690	" "

In the schools of all these periods today the average number of students per CR being constant (28), there results an accompanying decrease of area per student (from 27 to 24.5 sq.ft.).

1. STUDENTS (See App.6 , Sec. 2.1.5, No.1.)

Students in schools built between 1960-68, 1963-68 or 1966-68 accept their CR area 'as it is' more frequently than students in older schools.

These results are concurrent with the fact that the areas of the CRs are smaller in the more recent ones, (we know that actual area & satisfaction with it are inversely related).
The number of students & the area per student seem to have no effect.

Do the ethnic differences affect these results, & does 'Opening Year' influence all the previous findings?

There are more Fr. schools than Eng. schools built between 1960-1968, 1963-1968 & 1966-68, while in all the preceding periods more Eng. schools are built.

Also, a greater proportion of Fr. schools are built in the more recent years than in the previous years . In the case of the Eng. schools we find either an equal number of old and new schools, or more old rather than new schools.

On the other hand, older Eng. schools evoke much less area satisfaction than newer Eng. schools, as well as less than older Fr. schools; in some cases older Fr. schools evoke more satisfaction than new Fr. schools; finally, new Eng. schools nearly always evoke less satisfaction than new Fr. schools.

This means that the age of the building is responsible to some extent for the differences between Eng. & Fr. student responses, but ethnic differences account for those variations even more strongly than the building age.

'Opening Year' may explain the higher area satisfactions in lower income level districts & in suburban locations.

1. TEACHERS (See App.6 , Sec.2.2.5, No.1.)

Teachers in schools of 1957-1962 show a higher satisfaction with 'area', 'number of students' & 'storage' than teachers in schools built before or after that period.

This finding does not account for the higher satisfactions in Fr. than in Eng. schools, since more Eng. rather than Fr. schools are built between 1957-1962.

It does neither account for the differences noted between income levels, nor between locations.

There may be other reasons, such as the actual number of students in the CRs, or other factors, such as psycho-sociological influences, which may be responsible for these variations.

3.5.2. THE THERMAL ENVIRONMENT

1. STUDENTS (See App. 6 , Sec. 2.1.5, No.2.)

Absolutely no variations occur in student responses to the thermal atmosphere between old and new schools.

2. TEACHERS (See App.6 , Sec 2.2.5, No.2.)

Teachers in schools built between 1951-1965 show a higher satisfaction with the 'thermal atmosphere' than teachers in schools of 1966-1968. A similar but non-significant trend is observed with 'ventilation'.

This may have affected & been affected by the fact that Eng. teachers are more satisfied than Fr. teachers (as more Eng. than Fr. schools are built between 1951-1965, while between 1966-1968 more Fr. schools than Eng.ones are built).

It may similarly have an effect on, and be under the effect of, the higher satisfactions of lower middle income district schools, & of semi-urban schools (although insignificant).

3.5.3. THE LUMINOUS ENVIRONMENT

1. STUDENTS (See App.6 , Sec. 2.1.5, No.3.)

The higher satisfactions occur in the schools of 1957-1962, with respect to the 'light in the CR', as well as in the schools of 1960-68 & 1966-1968, but these differences are too minimal.

Note that more Eng. than Fr. schools are built between 1957-1962, but less between 1960-1968 & between 1966-1968.

Note also that 'Opening Year' cannot account for the differences seen between income levels, since middle income districts (highest satisfaction with 'light in the CR') have fewer schools built in the above mentioned periods than the other income level districts. The same is true for location.

2. TEACHERS (See App.6 , Sec.2.2.5, No.3.)

Almost no significant differences are discerned, although slightly higher satisfactions are seen in newer schools.

3.5.4 THE AURAL ENVIRONMENT

1. STUDENTS (See App. 6 , Sec. 2.1.5, No.4.)

Students in the older schools hear their teachers 'very well' more often than those in newer schools.

2. TEACHERS (See App.6 , Sec. 2.2.5, No.4.)

No significant variations are recorded.

3.5.5. ATTITUDES

1. STUDENTS (See App.6 ,Sec. 2.1.5, No.5.)

Without failure, in all cases, & in both questions ('Being, 'Remaining'), students in newer schools have more positive attitudes than those in older schools.

Once again, remember that there are more Fr. than Eng. schools in the newer ones; there are more new Fr. than new Eng.schools; there are more old Eng. than old Fr. schools.

There are more new schools in lower & in upper income districts (highest positive attitudes); there are more lower income schools in the newer than in the older ones; there is at least an equal number of upper income level schools in the newer as in the older ones.

These results are not consistent with those of the different location groups.

2. TEACHERS (See App.6 , Sec. 2.2.5, No.6.)

No significant differences between old and new schools in the responses of the teachers. This is surprising.

3.S. SUMMARIES

3.S.1. LANGUAGE

(See Graphs 3.1.)

- There are differences between the English & the French in their appreciation of the CR area. The Fr. students are more satisfied than the Eng., so are the Fr. teachers, despite their having smaller CRs.
- Eng. teachers find the thermal environment of their CRs more adequate than do the Fr. teachers.
- Although they have generally lower light intensities in their CRs, the Eng. students are more satisfied with the lights than the Fr.
- There are also different colour preferences between Eng. & Fr. students. The former like light blue the most, while the latter like white.
- Both Fr. students & teachers have more positive 'attitudes' than their Eng. counterparts.

3.S.2. INCOME LEVEL

(See Graphs 3.2.)

- No very consistent differences are discerned throughout all aspects of the environment among the 4 income level districts, however students in the middle level usually express higher satisfactions, while it is the teachers of the lower middle districts who do the same.

3.S.3. LOCATION

(See Graphs 3.3.)

- Similarly, no conclusions can be made vis-à-vis preferences of the different locations, although children in suburban schools show an advantage over the rest, while teachers in the semi-urban schools are the most satisfied.

3.S.4. GRADE

(See Graphs 3.4.)

- No significant variations are observed between VIth & VIIth graders.

3.S.5. OPENING YEAR

(See Graphs 3.5.)

- Student responses are more positive in the new schools than in the old schools towards the spatial & the luminous environments, & less positive towards the aural environment. The thermal environment makes no difference. Also, the student attitudes are more positive in the newer schools.

- The age of the school building does not seem to exert such clear influences on the teachers' responses.

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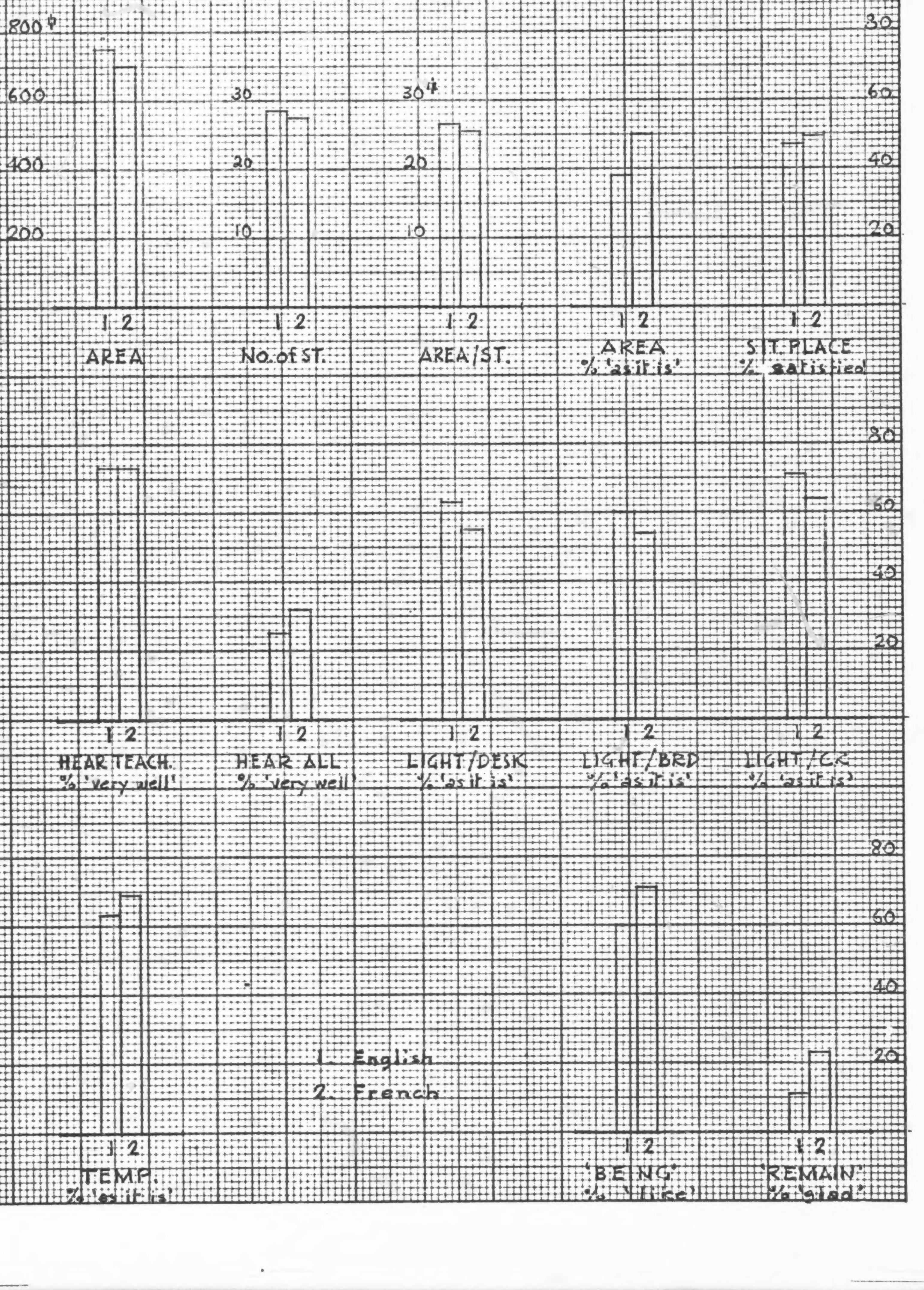
GRAPHS

3.1 LANGUAGE

1. STUDENTS

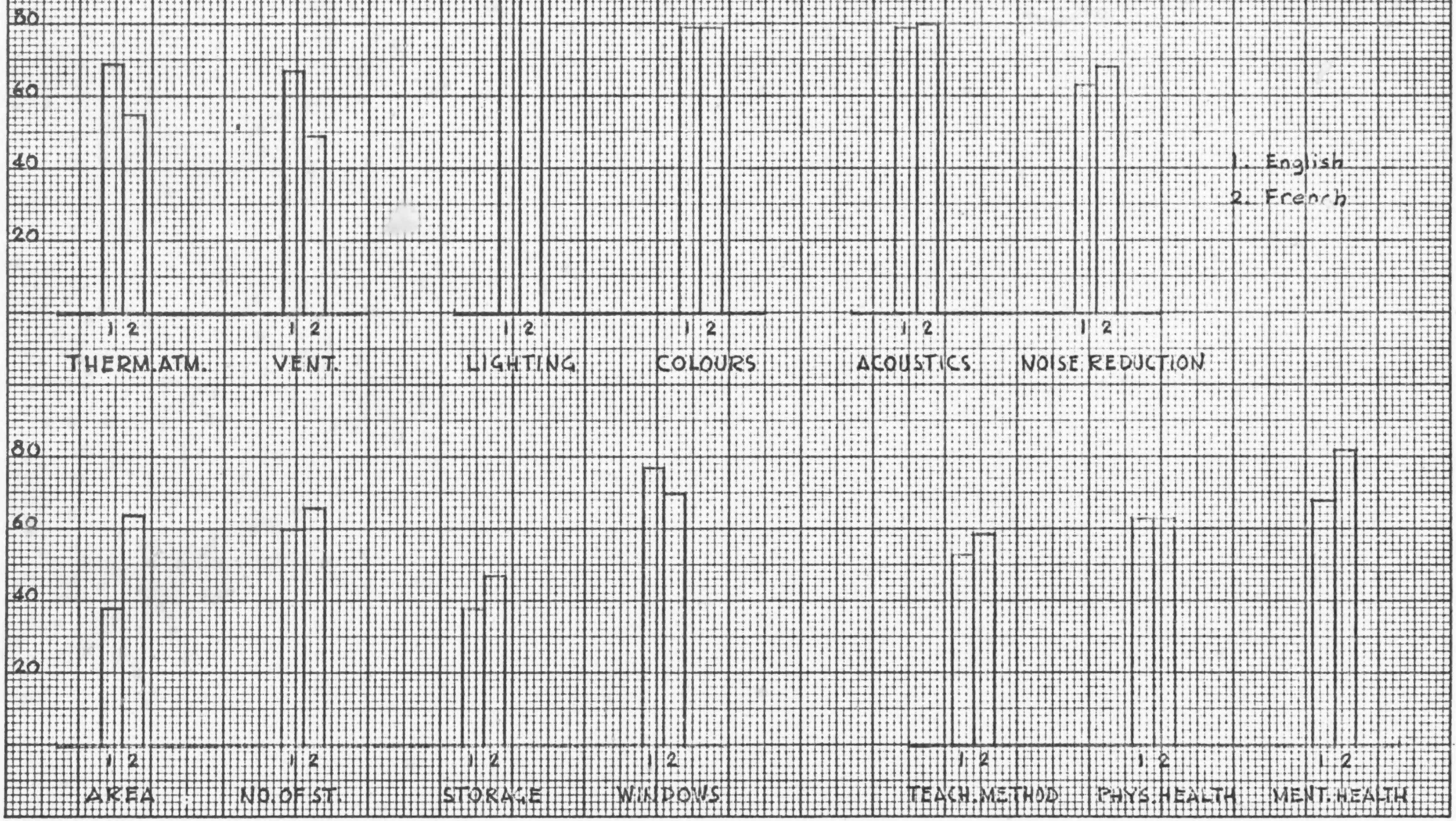


part 3 - p. 15

GRAPHS

2. TEACHERS

% 'adequate'

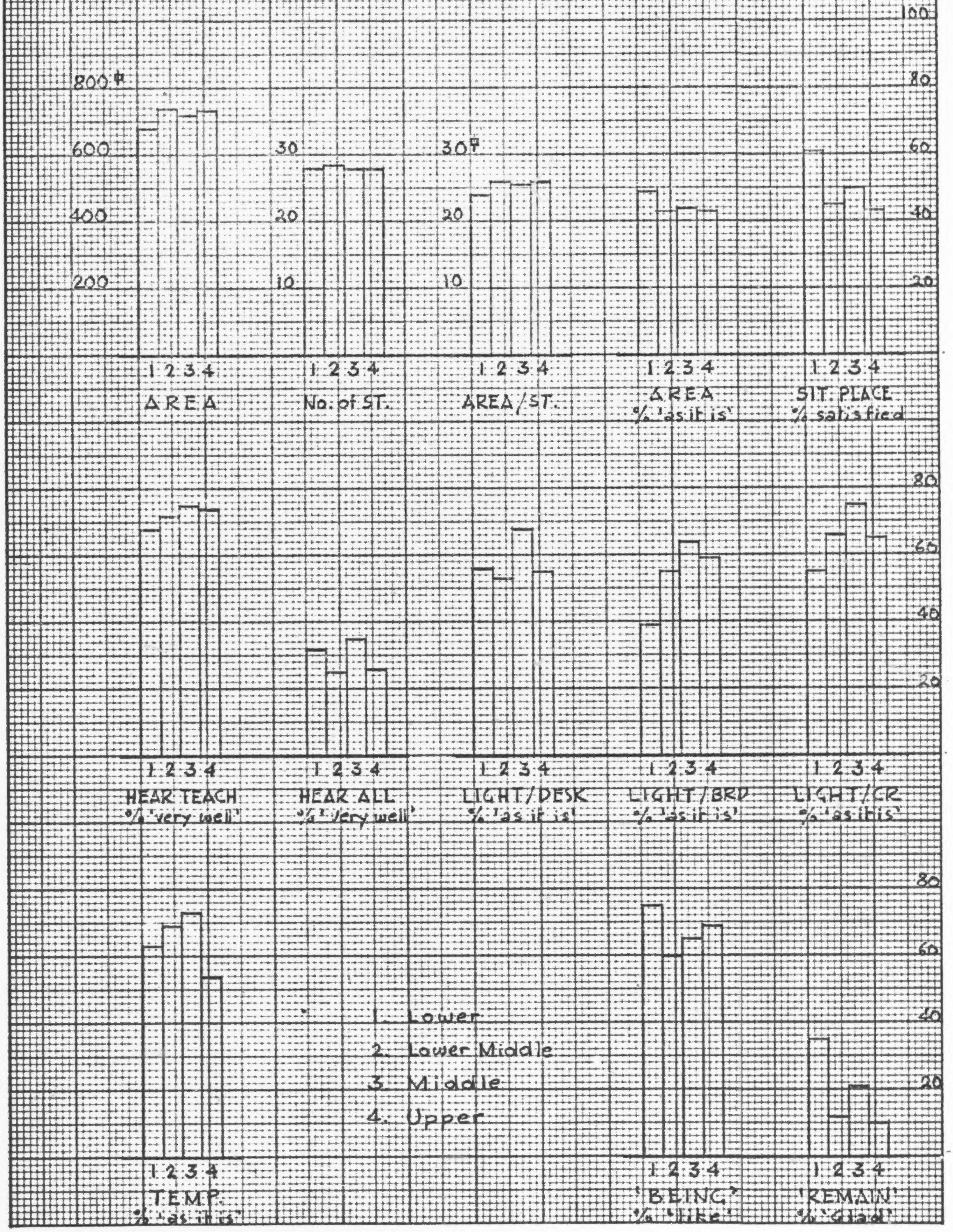


GRAPHS

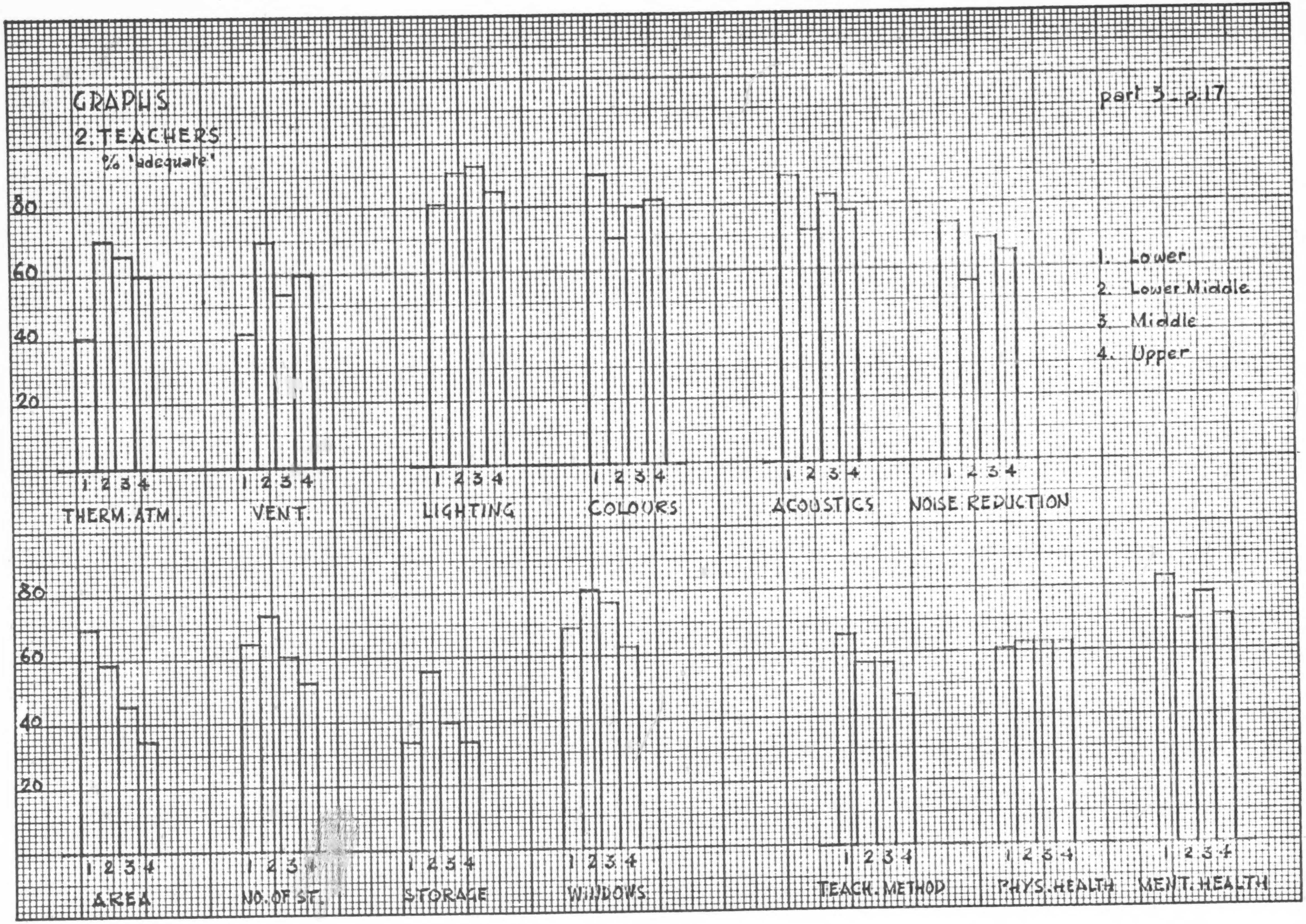
3.2. INCOME LEVEL

part 3-p.16

1. STUDENTS



part 3 - p.17



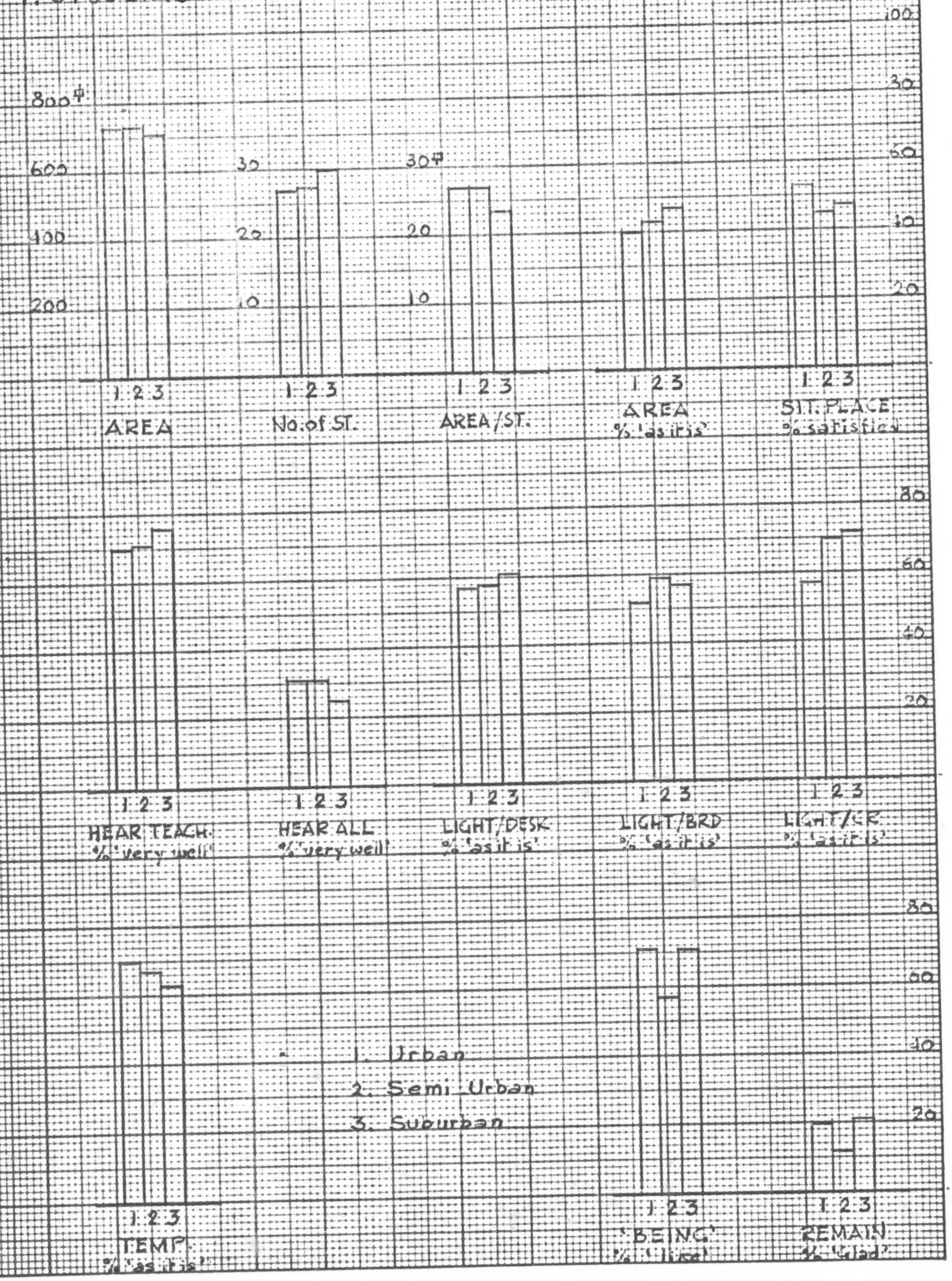
GRAPHS

2. TEACHERS

% 'adequate'

GRAPHS 3.3. LOCATION

1. STUDENTS



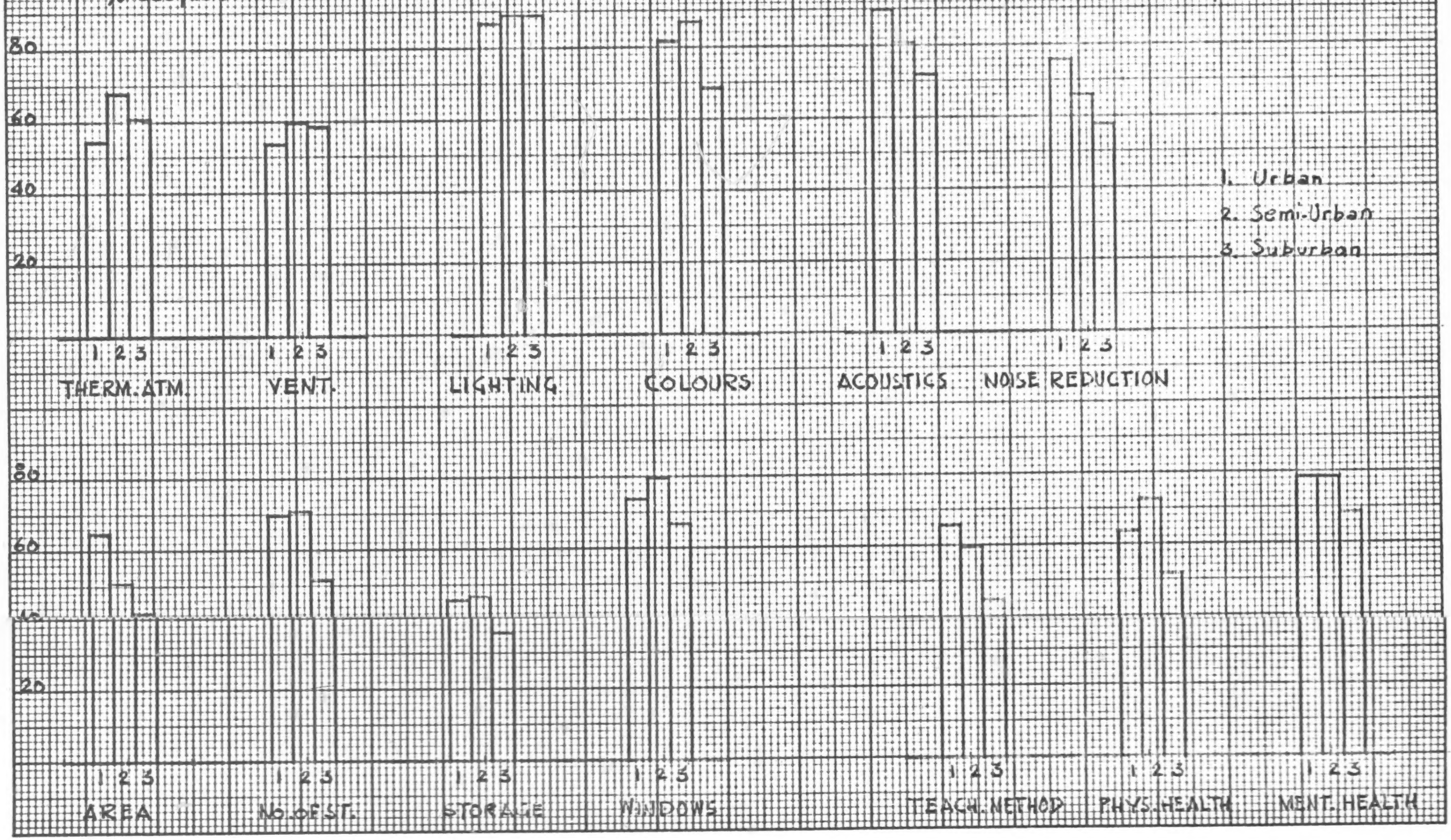
1. Urban
2. Semi Urban
3. Suburban

GRAPHS

2. TEACHERS

%'adequate'

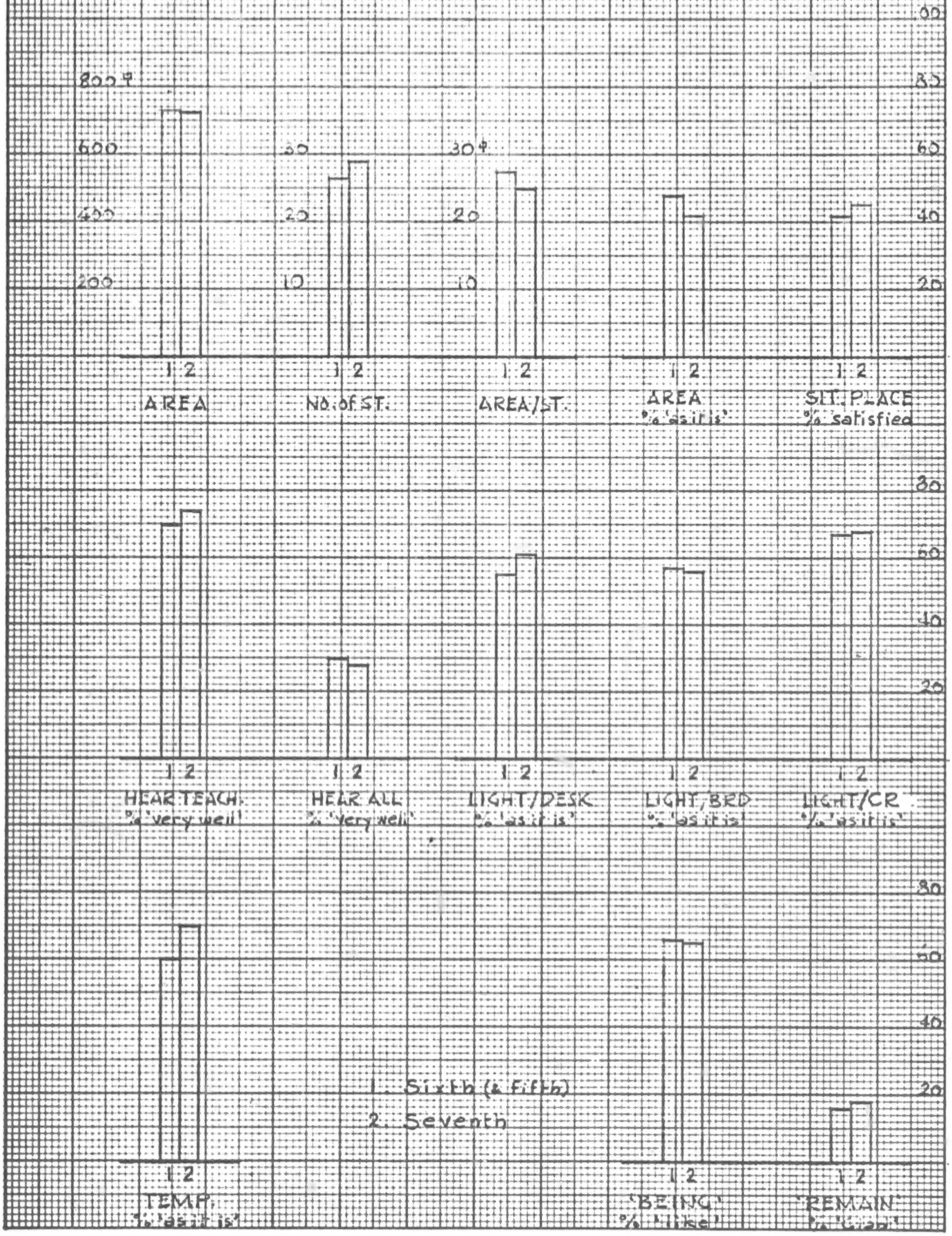
part 3 - p.19



GRAPHS

3.4. GRADE

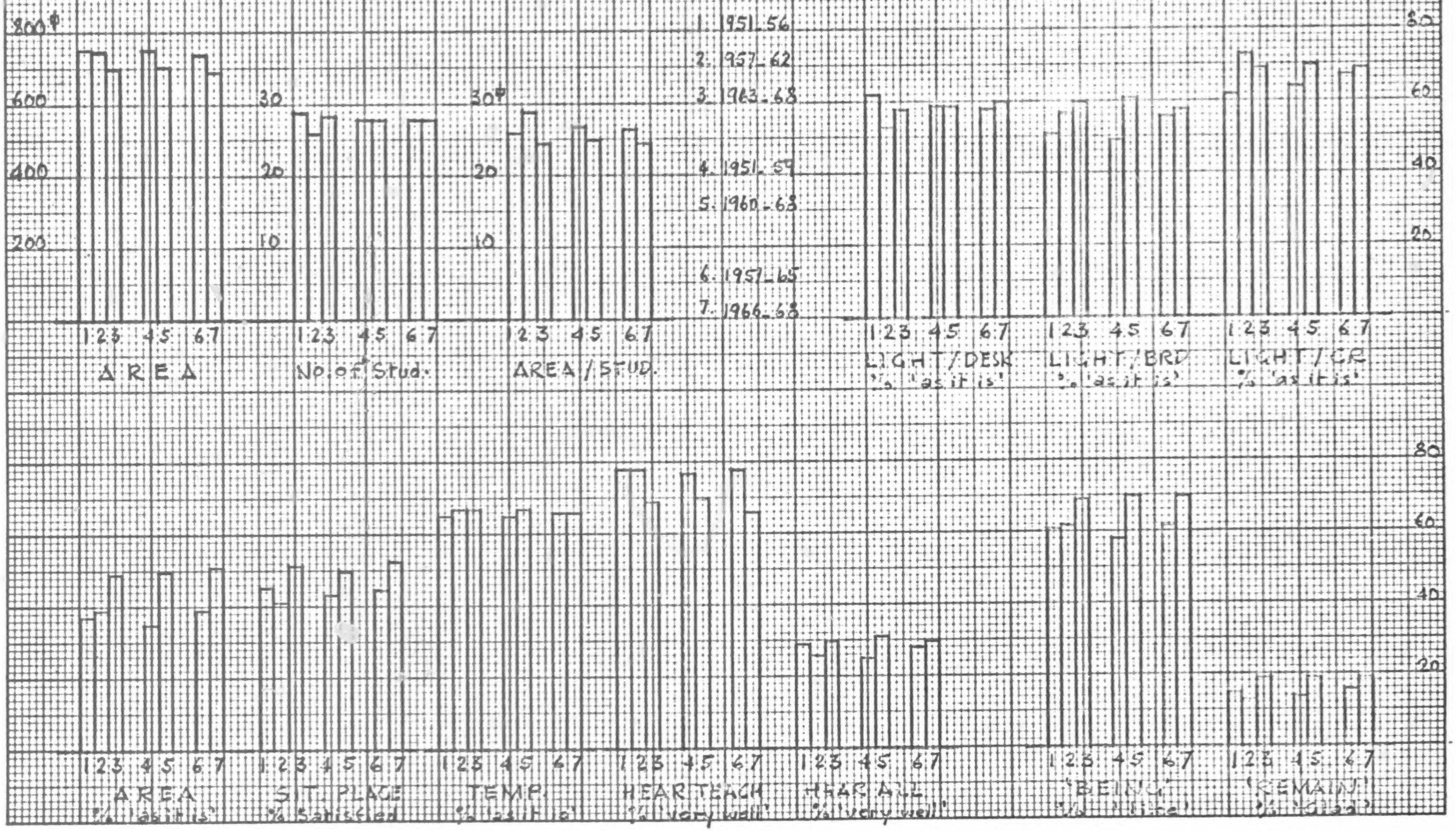
1. STUDENTS



GRAPHS

3.5 OPENING YEAR

part 3_p.21

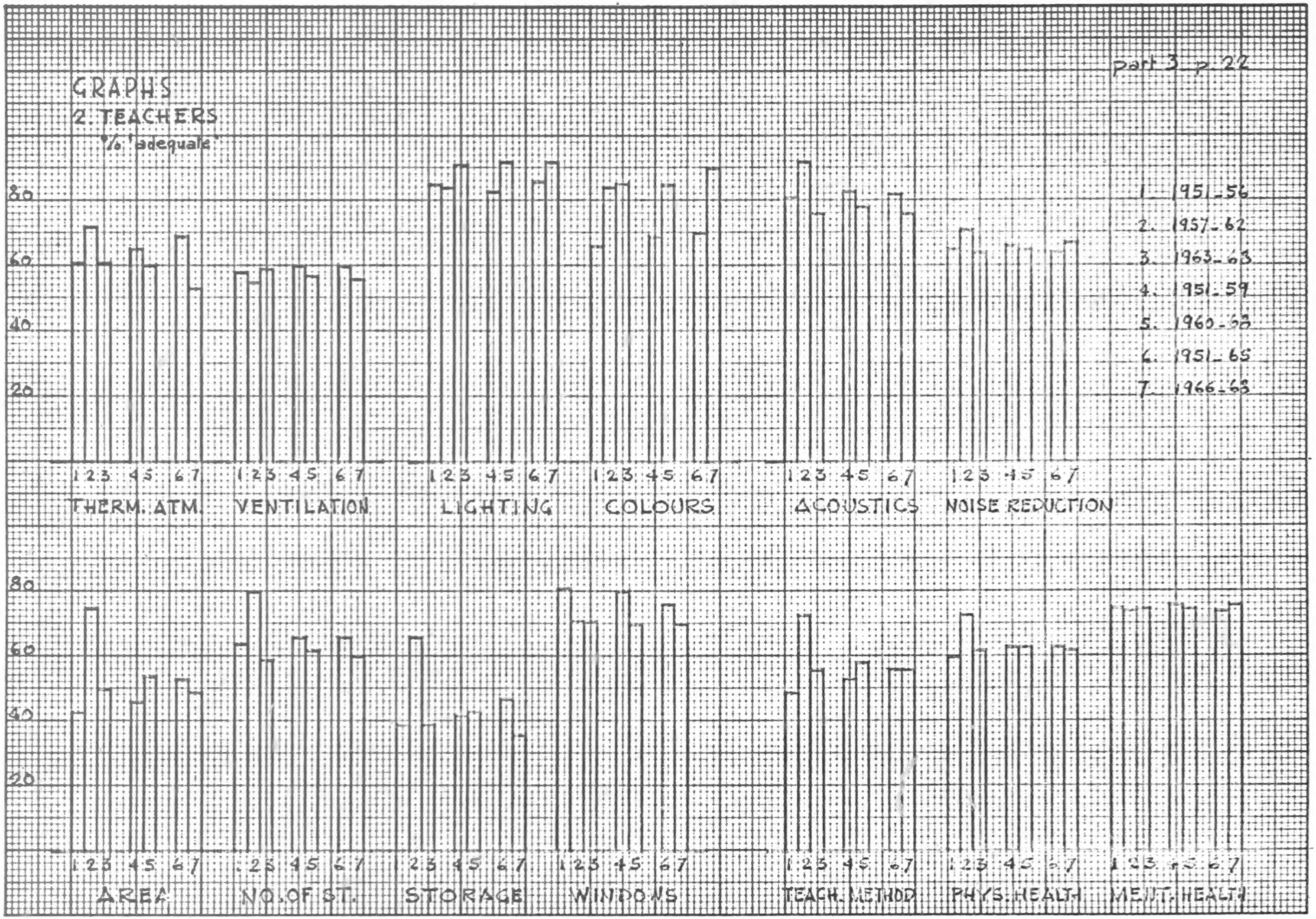


part 3 p 22

GRAPHS

2. TEACHERS

% 'adequate'



3.C. CONCLUSIONS

Apart from the physical factors themselves, as well as the attitudes of the students & the teachers, there are other so called 'invisible' factors which play a part in their appreciations of the physical environment.

The ethnic differences of the occupants & the age of the occupied (school building, in this study), are two such factors the influences of which are very well observed in the responses of the students & the teachers.

Fr. students, on the whole, are more satisfied than their Eng. counterparts with the spatial environment, while the Eng. students, more than the Fr., are satisfied with the luminous environment. Different colour preferences have been found between the two ethnic groups. Also, the Fr. have more positive attitudes than the Eng.

The Fr. teachers too have higher satisfactions with the spatial environment than Eng. teachers. The latter, on the other hand, are satisfied with the thermal environment more than the Fr.
Judgement of the adequacy of the CR are higher in Fr. than in Eng. schools.

In new schools students show more satisfaction with the spatial & the luminous environment & less satisfaction with the aural environment, than in old schools.

However, much research is needed in order to arrive at quantitative conclusions which will be useful in the design of buildings.

PART FOUR

THE MOST LIKED & THE LEAST LIKED CLASSROOMS

(See App. 7, Sec. 2.)

4.1. MOST LIKED CLASSROOMS

with respect to student responses to the environmental factors

No. of SCH.	LANG. INCOME LOCAT.	PARENTS' OCCUPATION	SURROUNDING CONDITIONS	BLG. PLAN TYPE	OP.YR. ENROL.
21	FR M S/U	professionals, clericals, some labourers	vast yard, new duplexes, triplexes, distant high-rise apts	L-shpd.	1968 (338)
30	FR M S/U	some professionals, technicians	park, church, bungalows, duplexes	T-shpd.	1961 (617)
29	FR L U	labourers, transportation, unemployed	2 older schools, church, bungalows, new triplexes, duplexes	cluster shpd.	1967 (829)

4.2. LEAST LIKED CLASSROOMS

with respect to student responses to the environmental factors

No. of SCH.	LANG. INCOME LOCAT.	PARENTS' OCCUPATION	SURROUNDING CONDITIONS	BLG. PLAN TYPE	OP.YR. ENROL.
3	ENG. LM S/U	blue collars	vast yard, small park, duplexes, triplexes, distant factories.	L-shpd.	1957 1968 (753)
23.	FR L U	labourers, unemployed	slums, 2-3 storey houses, the Royal Artillery	L-shpd.	1967 (665)
24	FR U S	professionals	Forest, bungalows	Z-shpd.	1967 (600)
5	ENG M S/U	manufacturers, professionals	bungalows, distant airport	L-shpd.	1956 1958 1960 (825)

GRADE ANSWERING FLOOR OF CR	CR.TYPE PLAN SHAPE SEATING ARR.	AREA NO.OF ST. AREA/ST.	EFF.TEMP. HEATING SYSTEM	LIGHT/DESK LIGHT/BRD LGT.SYSTEM
VI mixed 2nd	FP NSQ active	670 sq.ft. 25 27 sq.ft.	68 F E F	130 ft.cndles 105 " " F A
VII mixed 2nd	FP LR conv.	720 26 28	74 W	140 125 I
V mixed 1st	OP NSQ conv.	670 27 25	72 W F	110 60 F A
VI mixed 1st	FP LR conv.	770 34 22.5	68 W V	46 25 F L
VI boys 4th	OP NSQ conv.	670 27 25	67 W F	130 85 F A
VI mixed 1st	FP WR conv.	760 34 22.5	70 W	130 85 F A
VII mixed 1st	FP WR active	760 35 21.5	68 W V	80 40 F L

DESKS & CHAIRS	FINISHING MATERIALS
nat.wood standard, wood chairs	Fl: beige v-a.tiles Wl: light green conc.blocks,cork tack surfaces Cl: acoustic tiles
nat.wood, metal support. lam.pl.top, attd.plywd.seats	Fl: beige v-a.tiles Wl: white plaster,light yel.dado; cork tack surfaces,green board Cl: acoustic tiles
nat. wood,met. support,lam.pl. top, attached fiberglass seats	FL: light olive-yellow carpet Wl: light yellow conc.blocks,beige vinyl-covered operable partitions as tack surfaces. Cl: white concrete Ts
nat.wood standard, wood chairs	Fl: beige v-a.tiles, brown & yellow insets Wl: light grey & cream-yellow conc.blocks Cl: grey acoustic plaster
nat.wood,heavy met.support, lam.pl.top, fiberglass chairs	Fl: light grey-green v-a.tiles Wl: light yel.green plaster,light beige vinyl covered oper.parts.as tack surf.green brd. Cl: acoustic panels
nat.wood, met.support, attached plywood seats	Fl: yellow brown terrazzo Wl: white-cream & yel.conc.blocks,green board. Cl: acoustic tiles
nat.wood standard, wood chairs	Fl: beige v-a.tiles Wl: green-turquoise conc.blocks,darker dado, grey & black tack surfaces Cl: white conc.,acoustic tile perimeter

WINDOWS - VIEW	OTHER REMARKS
not wall to wall;wood,fixed upper large inswing.,lower small parts; venetian blinds; view:yard,back-yards	colrful paintings & pastings on rear tck surface;windows above side board;no cluttering of books, etc., tidy
wall to wall; alum.,fixed large upper,sliding small lower parts;shades view:bungalows,trees,etc..	many colrful paintings on tack surfaces;windows above side board;counter below windows; tidy
wall to wall;alum.,large fixed,small inswinging parts; view:bungalows,other school, yard(sun-breakers,curtains)	colrful painting; large table for group work(folding); counter below windows; tidy

wall to wall.,wood,double hung; venetian blinds; view: yard, triplexes	drawings, clippings; windows above side board; sink; long bookshelves; plants; tidy
wall to wall;alum.,fixed, casement;curtains;St.face opp.wall; view:slum roof tops,sch.gym top,mountain	drawings, paintings, statuettes windows above front board;sink; cupboard below windows;unused desks at one corner
almost wall to wall;sills at 5'& 2';metal,double hung, fixed;shades;St.face opp.wall; view:yard,forest,bungalows	colrful paintings etc.,windows above front board; wall to wall counter & cork covered cupboards; sink
wall to wall;wood,double hung; venetian blinds;st.face opp. wall; view: yard,back-yards	few paintings; wall to wall bookshelves; sink

4.3. MOST LIKED CLASSROOMS
with respect to student attitudes

No. of SCH.	LANG. INCOME LOCAT.	PARENTS' OCCUPATION	SURROUNDING CONDITIONS	BLG. PLAN TYPE	OP.YR. ENROL.
29		See Sec.4.1. above			
19	FR L U	unemployed, unskilled & semi-skilled labourers	small park, railroad tracks, a garage, an old office-factory blg.	compact	1967 (455)
25	FR M S	managerial, some unemployed	forest, some bungalows	cluster	1968 (575)
6	ENG M S/U	professionals, mid-management	vast yard, autoroute, duplexes	L-shpd.	1964 1966 (381)

4.4. LEAST LIKED CLASSROOMS
with respect to student attitudes

20	FR M S/U	salesmen, professionals,	duplexes, 1-2 storey houses, another school	Compact	1964 (560)
10	ENG LM S/U	craftsmen, clerks	a district of bungalows, another of low rental apart.s, nearby small park, factories	L-shpd.	1959 (197)
5		See Sec. 4.2. above			
15	ENG M U	clerks, management	large park, a synagogue, 2-storey houses, 3 storey apt. blgs.	Z-shpd.	1955 1959 (451)

GRADE ANSWERING FLOOR OF CR	CR TYPE PLAN SHAPE SEATING ARR.	AREA NO.OF ST. AREA/ST.	EFF.TEMP. HEATING SYSTEM	LIGHT/DESK LIGHT/BRD LGT.SYSTEM
VII girls 2nd	FP NSQ conv.	670 sq.ft. 25 27 sq.ft.	70 F W F	275 ft.cands 230 " " F A
VII mixed 1st	FP SQ active	675 29 23.5	67 E	60 30 F A
VI mixed 1st	FP NSQ conv.	650 25 26	67 W F	110 45 F L
VI mixed 2nd	FP LR conv.	840 29 29	67 W F	180 105 F A
VII mixed 2nd	FP LR conv.	860 30 28.5	68 W V	110 60 F L
VII mixed 2nd	FP LR conv.	765 28 27.5	69 W V	70 35 F L

DESKS & CHAIRS	FINISHING MATERIALS
nat.wood, metal support, lam.pl.top, fiber-gls chairs	Fl: light-grey v-a.tiles Wl: light grey conc.blocks,corktack surfaces, green board Cl: light grey plaster
metal, lam.pl. top, movable plastic troughs, plywood chairs	Fl: green carpet Wl: light yellow-cream conc.blocks,cork tack surfaces, green board Cl: wood battens & lam.wood beams
metal, lam.pl.top, plywood chairs	Fl: turquoise v-a.tiles Wl: light turquoise conc.blocks,tack surfaces of various colours Cl: grey acoustic plaster
nat.wood,met. support,lam.pl. top,attached plywood seats	Fl: travertino imitation v-a.tiles Wl: cream conc. blocks,cork tack surfaces, green board Cl: acoustic tiles
nat.wood standard, wood chairs	Fl: brown v-a.tiles Wl: conc. yellow blocks Cl: light grey acoustic plaster
nat. wood standard, wood chairs	Fl: beige v-a.tiles Wl: cream-yellow conc.blocks,acoustic tiles above 7 ft. Cl: white conc.

WINDOWS - VIEW	FINISHING MATERIALS
wall to wall;alum.,sliding, fixed upper parts;curtains; view: railroad tracks,factory, distant viaducts	pin-ups,cut-outs,some paintings, religious decorations,plants; windows above side board; tidy
small window,fl.to ceiling; alum. in wood frame;built-in venetian blinds; view: yard, trees, some bungalows	pin-ups; sink & other furniture; vent. sashes over side board & over the exterior wall; tidy
almost wall to wall; wood, double hung; curtains; view: parking lot, street, apartment bgs	paintings,graphs,student work profusely displayed; sink, shelves, etc.
almost wall to wall; metal; many sizes and types; view: duplexes	drawings, pin-ups; shelves,etc. windows above side board & also on rear wall; unusually long room
wall to wall; wood, double hung; view: roof tops of bungalows	pin-ups, charts; long shelves on rear wall; unused chairs turned down on these shelves; sink
wall to wall; wood,fixed upper part,inswinging lower part; view: synagogue,bungalows,apt.blgs.	unusually abundant decorations: paintings,pin-ups, student work everywhere (ceiling,mullions, desks etc.);sink; cluttering

4.C. CONCLUSIONS

Note: In order to determine the ranked order of the CRs according to the students' responses to the environmental factors, I have just summed up the average percentages of all the responses per school. The CR with the highest mark becomes the "most liked", & the CR with the lowest mark, the "least liked", the remaining CRs ranging gradually in-between. The same procedure is followed with respect to student attitudes. Of course, teachers' responses are not considered, since each teacher works in a different CR.

When comparing the factual data about the most liked & the least liked CRs, we come across further confirmation of some of the previous findings, as well as upon some aspects which were not apparent up till now.

For example, all 3 most liked (envir.) CRs & 3 out of 4 most liked (attit.) CRs are in Fr. schools, while more than half the least liked CRs are in Eng. schools.

Also, all most liked CRs, but only 3 least liked CRs, are found in schools built after 1960.

Almost all most liked CRs are square or nearly square in plan, while almost all least liked CRs are rectangular.

Smaller areas & smaller enrollments are noted in the most liked than in the least liked CRs.

A very interesting observation is that in 3 out of 4 least liked (envir.) CRs students face the wall opposite the windows.*

It can be assessed here that apart from the differences between the most liked & the least liked CRs, there are also many resemblances, & this only confirms what was already said, i.e.,that more than the factors themselves it is the way the children feel towards these factors which really determines their responses.

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* This is another most important aspect requiring further research.

EPILOGUE

1. GENERAL CONCLUSIONS

See also 'Conclusions' at the end of each part of the text. Once more it should be pointed out that these conclusions pertain only to the conditions of the 32 schools studied.

1.1. The first fact which becomes apparent is that environmental factors do not affect us in separate or independent ways, but rather in a combined manner. Our reactions to one factor, say area, are indeed unconscious reactions to all the other factors too, like sound, light, etc.

1.2. Moreover, our satisfaction with any factor is conditioned by the way we feel towards it more than the way it really is. Any given area is large or small because we are used to consider it so & our perception of it is coloured by our habits & idiosyncrasies.

1.3. Students' & Teachers' attitudes in the school are related to their satisfactions with the environment.

1.4. Both the responses to the environmental factors & the attitudes of the occupants are under many other influences, such as those of the ethnic origin, the age of the school building, etc.

1.5. Man is capable of adapting himself to & being satisfied with a wide range of environmental conditions, but there remains to be found the limits of that adaptability.

1.6. Teachers are most aware of the characteristics of their surroundings in relation to their teaching method, but their awareness decreases with respect to the adequacy of the CRs for the physical health of their students, & becomes least with respect to their mental health.

1.7 Students are more critical of their physical environment than their teachers & whereas sometimes they agree in their evaluations, in many other instances what is considered optimal by the children is not so by the adults.

1.8. Finally, much more research is required in order to establish environmental criteria to satisfy the total needs of the occupants of a building & to provide the appropriate surroundings so that the desired activities can take place within them. Tests need to be done to arrive at quantitative results which can then be used in the designing of spaces.

2. PROPOSALS

Throughout the text many issues have been pointed out in the form of footnotes, as requiring further research. In addition, based upon the information already gathered through the Survey on 32 Elementary Schools, studies can be carried on in the following topics:

- The site of the school (student responses).
- The appearance of the school building (student & teacher responses).
- The different facilities of the school, like the entrance, the gym, etc. (student & teacher responses).
- The teachers' room (teacher responses).
- Recess time, where & how is it spent (student & teacher responses).
- Non-graded school system, team-teaching & open-plan schools (teacher responses).

- The correlations of the above.
- The relationships of the above with responses to the environmental factors in the classroom, & with students' & teachers' attitudes.
- The analysis of the above according to social context (language, income level, and location) & school particulars (site, plan type, number of floors, opening year & enrollment).

3. RECOMMENDATIONS

3.1. To Educators

While I agree wholeheartedly with one of the principals (with whom I had the privilege & pleasure of having a lengthy & interesting interview) that the teacher comes first, not the building, & that the competent teacher will be able to educate even in a hut of hay, I can not, however, undermine the function of the physical environment, not only because it has far reaching effects on teachers & learners, but also because the School Building should not be the hut of hay, or any casual space.

Teachers are important, says Davis, "but the physical arrangement should facilitate the type of learning the teacher wants to accomplish." III-4(A)
L.J.Burrows believes that the school building should raise the performance of the average teacher. Teaching can be carried out anywhere, but will be "far more restrictive in kind & less effective in quality." "The best teacher cannot teach & the brightest child cannot learn to full capacity in a room that is too dark, too noisy, too warm or too cold," asserts Ludwig. X-2(A) II-9 (A)

Unfortuantely, a great proportion of teachers are not aware of the extent of the effects their physical surroundings have on them & on their teaching performance.

"For example, school goals emphasizing individual abilities & two-way communication may not be promoted by oblong classrooms with teacher stations fixed some distance from many of the students"... "Cooperation among department or team members may be influenced, at least in part, by whether the participants 'see' each other without prior arrangement or formality," writes Michelson. I-3 (B)

This unawareness is further reflected in the responses of the teachers to my questionnaire. They were given the following statement & asked to comment: "The school building may contribute to the attendance or the absenteeism (eventually to dropout) of the students."

Only 17.5% of the teachers totally agreed with it; another 13.5% thought that I was aiming at their own schools & hastened to assert that theirs 'encourage attendance'; 15% gave ambiguous or doubtful responses, mentioning among other things that only the very bad environment will affect, or that it will affect the teachers first, who by failing to excell, will in turn exert an undesired effect on the students; 22% either disagreed or gave totally irrelevant responses, while a sizable proportion, 34% abstained!

This is a discouraging state of affairs because, unless educators become totally aware of the amplitude with which the physical enclosure affects their teaching method & perhaps their whole outlook, they will not be able to tell the architect what they really need, & will always be hindered by environments which do not suit them. "Space designed for one function & utilized for another may not be in the best interests of all concerned," remarks Hall. III-9 (A)

One of the teachers who had filled my questionnaire reflected a prevailing mood when, being asked 'where would she be during recess time & what would she be doing', replied with a laconic retort: "Question Indiscret." This is exactly what I am driving at; that is, the architect has to know everything, even the most 'indiscret' details, so as to provide the appropriate environment.

The architect will be helpless if his client has not formulated his needs very clearly; these will be assumed by the architect so that the design process begins. However he is not prepared to know what the client's needs will be, neither is he payed to undertake research to find them out. Usually he is given a list of quantitative requirements - so many rooms of so much sq.ft., so many lavatories, etc.- & is expected to juggle these elements & pull out of his magic hat... a building. II-13 (A)

Conservative educators think that schools function well as long as they are "kept warm & sanitary, painted throughout in calm pastel colours, & the necessary precautions are taken to insulate against odours in corridors & washrooms." X-13 (A)

The more progressive ones are asking for additional spaces, points out Prueter, but do not change their traditional methods, therefore are encountered with a limiting factor: cost.

The demand for "flexibility" has become a fashion. But as Cone finds it, "most administrators and architects do not have a specific program or specification for flexibility. They are only aware that they might be caught with their pants down if they can't claim to have it in their new buildings. I am sure that many have not adequately analysed the cost of measures they took to obtain flexibility." X-4 (A)

Even the Ontario Provincial Committee for Aims & Objectives in Education, after having stated that "schools are not factories, nor even learning factories," fails to describe what they really are. X-5(B) p.60 "The crucial question," says Manning,"... is 'what should be built?';... the most serious lack is of knowledge of the function, purpose, use & future of common building-types." 1-4(B) p.19

The architect needs to know what sort of people are going to use the school? What is their cultural, socio-economic, residential background? What sort of educational policy do the educators persue? What character traits & intellectual abilities do they want to develop in their students? What activities do they conduct in the different parts of the school? How do students sit, or do they sit at all? What sort of articles do they store in their desks? etc. etc. This is the information needed in order to design a school.

"There is an urgent need for serious, co-ordinated discussion between architects & educators, in which the latter should try to resolve their own conflicts before telling the architect the nature of environment & how to build a school," indicates R. Gretton. VII-10(AM), Sp.'63

In order that the building program become "a statement of purpose rather than a list of hardware" and "the image of the school ... be related to man's educational needs," educators should have complete cognizance of their needs & present them to the architect in as much detail as possible. II-20(B) p. 9 II-13 (A)

This Thesis has shown how people can have positive attitudes in environments they like. It would be the educators' task to designate the particularities which make one environment more 'successful' than another, so that architects be able to provide spaces designed according to the needs & preferences of the occupants.

3.2 To Architects

We, architects, have to know perfectly well how the environments we create affect their occupants, & to know perfectly how to create the environments which will affect them in the desired ways.

This Thesis has clearly pointed out the interaction of the various elements of the physical environment. Rodman has suggested that the architect think of a space "not just as big, but as one which should be big & noisy, big & hushed, big & warm, big & invigorating, big & bright, or big & shadowy. As a professional, he should also understand how to make these kinds of spaces." I-5(A) At the same time he has indicated the need (along with more use of modern science & technology), "for informed skepticism, too, about the sacredness of numerical engineering criteria, for example. How important is a standard foot-candle level? Does the precision with which a temperature recorder follows the temperature measure the satisfaction of the indoor climate?" I-5(A)

We have seen that satisfactions are very flexible and extend in a wide range. It should be our task to find out the optimum situations, because, as Studer remarks, "... the simplistic notion (held by many designers unfortunately) that man is 'infinitely adaptable' is critically erroneous. ... there are limits to adaptability." I-7(B) p.25

One way of collecting the necessary documentation is to involve the client himself in the studies prior to design. Let us not hesistate to go & ask all those who will be using our future building, what sort of place they would like to have. Perhaps 90% of what they say will be the fruit of their imagination, & too impracticable to be of any use, but the remaining 10% may give us clues & indications which we cannot find elsewhere.

I know that generally the future occupants of a school are not consulted. Administrations just don't bother to ask them, & schools are built which will not correspond to the educational methods the teachers want to adopt. So many of the principals I interviewed were amazed that somebody after all was interested in their opinions too, while others were very much aware that many deficiencies in the design occurred because they had not been consulted prior to the construction of the school. I believe we should take the initiative to go & inquire.

One of the recommendations of the Ont.Prov.Com.
for Aims & Obj. in Educ. is "involve school staffs
in new school planning." Cron suggests that X-5(B) p.200
students too be consulted, so as to give them "a
sense of possession." I can only agree with them. X-5(A)
"Careful observations & extensive interviews with
the potential users is one way of gaining knowledge about their behavior." I-7(B) p.6

Another way of doing it is to observe the performence of the building a certain time after it has been inaugurated. Let us not escape from our creations. Our job as architects is not finished with the handing of the keys. Let us ensure that the spaces we have designed are being used effectively, & let us "not leave to the janitors the
care of enforcing spatial norms." II-20 (B)p.10

I recall a CR where the teacher was explaining to me that the conventional row seating pattern I could see on that visit was not the usual way, but as they had recently come back from the holiday recess, they had not had time to change what the janitor had thought to be a normal seating arrangement.

Yes, we should follow our new born baby step by step. "Individual practitioners must abandon the philosophy of 'never look back'. ... Once the structure is opened for public use, the architect disappears from the scene," complains Sommer. II-20(B) p.4 Indeed, we should go back & see how the building really works. As Prueter proposes, we should "turn to our teachers & ask them to help us identify the most successful characteristics of the schools we have provided." X-13 (A) It is equally important to gauge the student responses to their built environment. II-13 (A)

Only in this way we can learn from our own experience. Is there a greater asset for the architect?

We should, however, never forget that past experience helps us only in a limited way. Whatever we learn from our last building can partly be useful for our next one which will have other occupants, other circumstances, & therefore will require a somewhat different environment. How many plans did I see, repeated over & over again, with complete disregard of the particularities of each situation.

Let us do justice to our clients.

3.3. To Administrators
(A Note)

I sincerely wish that officials in the different School Boards & in the Dept.of Education have the opportunity to read this thesis. Not few principals & architects have complained of the insufficiency of the budgets & the obsolescence of the norms. It is certain that there is an urgent need of re-evaluation of both.

In a society as affluent as ours, it seems incredible that not enough funds are available for school buildings. I have not tackled this question, as it does not fall in my sphere of competence, but I keep wondering about it. Wouldn't

4. POSTSCRIPT - ARRIVING AT A THEORY OF DESIGN

This study would be somewhat defective if, after all, it did not give a wider scope in what we know as the theory of design. Indeed, all the findings & suggestions which are included in the various parts of this thesis lead us to a richer, larger & deeper outlook at Architecture.

We realize that Architecture is so complex a realm that Form is only a distant cousin, & between the two there is a long line of close & not-close relatives; in them Man is the most privileged, most revered & most dominating member.

"...The emphasis on form which seems to prevail must be superceded by a concentration on spatial qualities & on the interaction of space & personality - in short the emphasis will have to be antiform," states Moller. II-17(B) p.129

Architecture, therefore, cannot be based only on the aesthetic sense of the architect & on his spatial visualizations (although it cannot exist without them). Neither can it be based upon the economics of the developer, the interests of the politician, the requirements of the structural engineer or the environmental specialists (although it cannot be realized without the harmonious accord of all these). II-4(B) p.11

Man should be the measure of Architecture.

Human Technology should set the criteria while Building & Environment Technologies should come in as slaves to serve Man. Indeed, from the cyclopian stones of the pyramids to the alum.& plastics of the geodesic dome, thousands of building materials have passed through & been mastered by the hands of the Builder-Architect, but Man has persisted with only one prototype, (with billions of subtle variations, though), and paradoxically has remained constant, constant in his never-ending change, constant with his frailties & forces, his human needs & satisfactions. Therefore, Architecture now should be thought of in terms of Man, not in terms of materials and methods of construction.

Architects should start considering buildings as "mediums", "with which others interact, & which influence the interaction between others. We must start worrying about the way buildings influence the staff they attract, & the interactions between headmaster, teachers & children," writes Canter, a psychologist. II-5(A) And adds Moller, an architect-turned industrial designer: "Instead of viewing it as an end-product, or as providing direct fulfillment for specific needs, we can better conceive of architecture as an agent, a catalyst, which is able to make possible a reduction of frustrations & tensions, & to aid in fostering emotional stability, improved personal motivation & improved social interaction." II-17(B) p.50

According to Studer, another architect, we should discard defining the problem as a "house", or a 'school": "The 'building type' mentality thus assures that the problem space is arbitrarily described, prematurely closed, & the behavioral goals of the inhabitants constrained without ever having been analysed." Indeed, he suggests that we adopt "A behavior - contingent approach, (which) rejects the stereotyped 'list of physical requirements' in favor of a more basic & relevant taxonomy." I-7(B) p.4

Instead of the classical conception of Architecture as Function, Structure & Aesthetics, we should think of Man-Activity-Environment, & this, not on a linear but a triangular basis, with simultaneous interaction among all three of the apexes. I-1(B)

Whereas in the old concept Architecture was a static entity (due to the stability of its 3 elements), now it becomes a dynamic system because everyone of its 3 constituents is an everchanging system itself.

As Studer points out, changes can occur in any one of the systems, therefore The System itself should be open-ended, & should undergo constant analysis to verify whether or not it has the desired environment & is resulting in the desired behavior (or activities). "An environmental solution, considering the uncertainties involved, should not be viewed as a solution at all, but a complex hypothesis." "The experiment is the solution." I-7(B) p.27-2

New tools shall be needed in this "experiment", & "Wehrli suggests that we find 'design building blocks' which evaluate psychological responses to phenomena equivalent to the metred evaluations of physical conditions." II-4(B) p.11

Put in simpler words, we should find effective ways of "appraising the performance of buildings." I-4(B) p.22

The present study has been a modest attempt.

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APPENDIX ONE

THE ENVIRONMENTAL FACTORS

1. THE SPATIAL ENVIRONMENT

	1.0.DATA					1.1.STUDENTS			
						1.1.1. Area(*)			1.1.2. Sitting, actual & preferred places coincide (*)
	1.AREA sq.ft.	2.No.of St.	3.AREA/St.. sq.ft.	4.CR SHAPE	5.Smaller windows	bigger	as it is	smaller	
Means	725	28	26			53	44	2	46.5
1	670	35	19	LR	X	52	48	-	39.5
2	790	31	25.5	LR		46	43	11	46
3	770	34	22.5	LR		71	23	6	36.5
4	715	23	31	SQ		45	55	-	65.5
5	760	35	21.5	WR		87	7	7	59.5
6	650	25	26	NSQ		73	27	-	59
7	675	30	22.5	O	X	54	40	6	38.5
8	700	24	29	O	X	12	88	-	41
9	740	24	30.5	LR		47	53	-	55.5
10	860	30	28.5	LR		81	19	-	48.5
11	785	32	24.5	SQ	X	76	24	-	43
12	830	24	34.5	LR		29	71	-	45.5
13	820	24	34	LR		74	13	13	45
14	675	30	22.5	SQ	X	36	64	-	30
15	765	28	27.5	LR		73	27	-	45.5
16	780	32	24.5	NSQ		58	42	-	56
17	670	24	28	NSQ		23	77	-	47
18	720	31	23	WR		34	59	7	53
19	670	25	27	NSQ		78	22	-	56
20	840	29	29	LR		35	54	11	34
21	670	25	27	NSQ	X	32	68	-	48
22	720	33	22	LR		45	55	-	45.5
23	670	27	25	NSQ		82	18	-	78
24	760	34	22.5	WR		87	9	4	53
25	675	29	23.5	SQ	X	44	56	-	70
26	730	26	28	SQ	X	33	63	4	58
27	700	27	26	NSQ		92	8	-	39
28	675	30	22.5	O	X	47	53	-	43.5
29	670	27	25	NSQ		8	92	-	71.5
30	720	26	28	LR		37	63	-	36
31	660	30	22	WR		44	52	4	38
32	660	16	41	LR		44	56	-	28

* - %age of the received responses per question per school
SQ-square, NSQ- nearly square, LR- long rectangle
WR-wide rectangle, O-open.

1.2. TEACHERS

	1.2.1. Area (*)			1.2.2.(*) No.of St.			1.2.3.(*) Storage			1.2.4.(*) Windows		
	A	BA	IA	A	BA	IA	A	BA	IA	A	BA	IA
Means	51	29	20	63	20	17	42	25	32	74	13	13
+ 1	8	31	62	33	8	58	8	23	69	62	8	31
2	33	33	33	83	17	-	83	-	17	100	-	-
3	60	-	40	70	-	30	64	27	9	73	18	9
+ 4	11	67	22	29	-	71	44	11	44	56	-	44
5	32	23	45	50	20	30	36	41	23	91	9	-
6	18	36	45	57	29	14	45	18	36	91	9	-
+ 7	25	50	25	17	33	50	-	25	75	83	17	-
+ 8	36	45	18	100	-	-	18	45	36	82	9	9
9	75	17	8	75	17	8	50	33	17	83	17	-
10	80	10	10	90	-	10	70	20	10	100	-	-
11	25	33	42	42	25	33	23	23	54	46	8	46
12	33	42	25	33	50	17	42	25	33	67	25	8
13	57	43	-	86	-	14	29	43	29	86	-	14
+ 14	58	25	17	69	31	-	46	15	38	46	31	23
15	53	20	27	100	-	-	27	40	33	87	7	7
+ 16	14	71	14	50	21	29	50	21	29	93	7	-
17	40	60	-	50	50	-	27	27	45	100	-	-
+ 18	79	21	-	57	29	14	80	7	13	85	8	8
+ 19	82	6	12	82	12	6	63	19	19	56	31	13
20	85	8	8	70	10	20	40	20	40	73	7	20
+ 21	75	25	-	89	11	-	63	13	25	89	11	-
22	27	60	13	42	33	25	13	20	67	73	27	-
+ 23	67	17	17	62	23	15	36	45	18	58	42	-
+ 24	45	25	30	50	20	30	40	30	30	50	15	35
+ 25	50	50	-	75	-	25	75	-	25	100	-	-
26	56	39	6	72	28	-	44	11	44	88	6	6
27	53	27	20	60	33	7	67	20	13	73	13	13
+ 28	50	17	33	75	17	8	42	50	8	58	17	25
+ 29	100	-	-	67	33	-	24	35	41	88	13	-
30	100	-	-	92	8	-	100	-	-	42	17	42
31	50	33	17	67	17	17	17	50	33	50	17	33
32	25	25	50	67	-	33	20	20	60	50	17	33

*- %age of the received responses per question per school
A-adequate, BA-barely adequate, IA-inadequate

+ 1966-1968

2. THE THERMAL ENVIRONMENT

	2.0. DATA				2.1. STUDENTS		
					2.1.1.(*) Therm.Atm.		
	1. TEMP. F	2. R.H. %	3. EFF.TEMP.F	4. HEATING SYSTEM	warmer	as it is	cooler
Means	73	54.5	69		18	66	16
1	72	35	66	WF	24	69	7
2	74	60	70	WV	22	64	14
3	72	50	68	WV	13	45	42
4	71	50	67	EF	18	73	9
5	73	45	68	WV	13	60	27
6	73	30	67	WF	4	73	23
7	72	60	68	EF	10	77	13
8	69	70	67	WF	18	82	-
9	73	45	68	W	47	47	6
10	74	40	68	WV	14	79	7
11	70	60	67	WF	45	52	3
12	71	65	68	W	10	45	45
13	67	55	64	WV	27	62	11
14	73	60	69	EF	-	52	48
15	73	60	69	WV	8	88	4
16	72	50	68	WF	50	38	12
17	75	50	70	WF	14	77	9
18	73	65	70	WV	-	96	4
19	75	55	70	WF	13	83	4
20	69	70	67	WF	31	58	11
21	72	60	68	EF	8	84	8
22	74	60	70	W	35	48	17
23	71	50	67	WF	32	59	9
24	74	55	70	W	4	50	91
25	70	60	67	E	19	81	-
26	71	65	68	W	21	67	12
27	80	30	72	WV	16	80	4
28	73	60	69	WF	34	59	7
29	77	50	72	WF	16	68	16
30	79	60	74	W	-	87	13
31	72	50	68	W	-	64	36
32	74	60	70	W	19	81	-

*-& %age of the received responses per question per school
W- hot water heater, F-forced air, E-electricity,
V- ventilation (exhaust grille).

2.2. TEACHERS

	2.2.1.(*) Therm.Atm.			2.2.2.(*) Ventilation		
	A	BA	IA	A	BA	IA
Means	62	20	18	58	20	22
1	50	42	8	62	15	23
2	100	-	-	100	-	-
3	90	10	-	55	18	27
4	78	-	22	89	11	-
5	62	29	10	50	36	14
6	91	-	9	91	9	-
7	50	33	17	42	25	33
8	80	20	-	100	-	-
9	67	17	17	75	25	-
10	90	10	-	70	20	10
11	83	8	8	54	-	46
12	67	8	25	75	8	17
13	86	-	14	86	-	14
14	58	8	33	69	8	23
15	62	15	23	53	27	20
16	43	29	29	57	36	7
17	22	22	56	18	27	55
18	77	23	-	79	7	14
19	53	20	27	38	44	19
20	87	-	13	60	13	27
21	67	22	11	89	-	11
22	50	21	29	53	20	27
23	18	36	45	46	23	31
24	70	20	10	53	16	32
25	75	25	-	75	25	-
26	41	35	24	53	6	41
27	69	15	15	69	8	23
28	58	17	25	50	33	17
29	38	44	19	33	47	20
30	50	-	50	8	25	67
31	33	50	17	-	57	43
32	67	33	-	83	-	17

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*- %age of the received responses per question per school
A-adequate, BA- barely adequate, IA- inadequate.

3. THE LUMINOUS ENVIRONMENT

	3.0. DATA				3.1. STUDENTS									
					3.1.1.(*) Light/Desk			3.1.2.(*) Light/brd.			3.1.3.(*) Light/CR			3.1.4. (**) Total
	1.FT.CNDLES ON DESKS	2.FT.CNDLES ON BRDS	3.LIGHTING SYSTEM	4.SKY CONDITIONS	more	as it is	less	more	as it is	less	more	as it is	less	as it is
Ms	109	625			27	49	8	20	44	14	20	61	9	28
1	40	20	FA	S	31	62	-	21	55	10	14	69	7	34
2	80	45	FL	S	11	64	-	18	46	4	11	75	7	32
3	40	25	FL	S	26	10	16	19	13	13	13	42	16	10
4	85	40	FL	C	9	64	5	18	32	27	9	77	9	27
5	80	40	FL	C	37	33	3	13	27	27	20	50	17	13
6	110	45	FL	C	27	36	5	23	41	5	5	68	9	22
7	140	40	FA	C	10	73	3	13	57	7	10	73	7	43
8	70	35	FL	S	23	47	-	6	35	-	-	65	12	35
9	50	25	FL	C	21	42	-	5	37	5	16	68	5	21
10	110	60	FL	C	14	53	11	18	39	7	7	79	-	36
11	65	30	F	HS	35	62	-	24	59	7	21	65	7	41
12	40	15	I	S	48	33	5	-	72	14	43	48	10	19
13	65	30	FL	S	35	39	4	17	30	22	43	43	-	17
14	80	50	FA	S	18	46	4	14	50	4	7	68	11	43
15	70	35	FL	C	12	73	8	12	46	35	12	69	19	35
16	90	50	FL	C	42	50	4	31	46	12	12	50	31	31
17	160	100	FA	C	5	36	-	-	23	9	14	77	5	18
18	110	60	FL	S	52	28	10	17	59	10	28	59	3	24
19	275	230	FA	S	35	52	9	30	39	22	35	39	22	13
20	180	105	FA	HS	31	62	8	19	69	12	23	69	8	42
21	130	105	FA	S	-	100	-	4	92	-	-	96	-	92
22	60	20	I	C	23	64	10	32	26	39	29	71	-	10
23	130	85	FA	HS	50	27	23	32	45	23	64	23	14	4
24	130	85	FA	S	37	28	16	25	31	12	9	56	16	12
25	60	30	FA	C	55	26	-	18	22	11	11	48	15	15
26	130	70	F	C	25	71	4	42	50	8	46	50	4	33
27	95	80	I	S	24	40	36	48	40	12	48	48	4	8
28	100	20	FA	C	30	33	23	20	40	23	23	47	20	17
29	110	60	FA	C	19	69	12	23	46	31	12	76	12	31
30	140	125	I	S	28	56	8	20	72	-	24	72	-	44
31	200	110	FA	HS	24	72	-	28	60	-	24	72	-	48
32	255	130	FL	HS	25	37	19	25	19	31	25	50	12	6

*-%age of the received responses per question per school.
**-%age of the total respondents per school.
F-flrsnt,I-incdsnt,L-louvred lum.,A-acrylic shade.
S-sunny, HS-hazy sun,C-cloudy.

3. 3.2. TEACHERS

	3.2.1.(*) Lighting			3.2.2.(*) Colours		
	A	BA	IA	A	BA	IA
Means	89	6	6	79	15	6
1	77	8	15	85	15	-
2	83	17	-	100	-	-
3	64	9	27	64	18	18
4	100	-	-	100	-	-
5	95	-	5	73	14	14
6	100	-	-	91	9	-
7	100	-	-	75	25	-
8	100	-	-	100	-	-
9	100	-	-	75	17	8
10	90	10	-	100	-	-
11	77	-	23	54	8	38
12	75	17	8	83	17	-
13	71	14	14	71	14	14
14	92	-	8	54	46	-
15	93	7	-	73	13	13
16	93	-	7	100	-	-
17	100	-	-	91	9	-
18	100	-	-	60	40	-
19	94	6	-	94	6	-
20	80	13	7	73	20	-
21	100	-	-	100	-	-
22	67	20	13	73	27	-
23	62	15	23	92	-	8
24	100	-	-	90	5	5
25	100	-	-	75	25	-
26	89	11	-	39	56	6
27	100	-	-	40	33	27
28	83	8	8	100	-	-
29	94	6	-	100	-	-
30	92	8	-	92	8	-
31	67	33	-	67	33	-
32	67	-	33	100	-	-

*- %age of the received responses per question per school.
A-adequate, BA-barely adequate, IA-inadequate.

4. THE AURAL ENVIRONMENT

4.1. STUDENTS

Hearing

	4.1.1.(**) Teacher			4.1.2.(**) Others			4.1.3.(**) TV			4.1.4.(**) Music			4.1.5.(**)-Total
	very well	fairly well	not well	very well	fairly well	not well	very well	fairly well	not well	very well	fairly well	not well	very well
Ms	71	22	4	34	43	11	29	17	14	47	19	14	29
1	76	21	3	31	48	10	38	21	24	45	24	17	38
2	86	14	-	36	36	4	36	18	11	43	21	7	38
3	39	32	3	16	26	10	10	10	3	16	10	6	6
4	77	23	-	27	50	9	36	23	27	27	27	14	32
5	53	30	10	43	27	10	17	27	20	23	17	23	13
6	82	18	-	59	23	-	55	14	9	59	9	9	59
7	47	37	10	23	60	3	10	23	43	27	17	33	7
8	41	35	12	35	29	23	6	6	-	18	18	-	6
9	89	10	-	37	10	-	21	16	5	32	5	5	31
10	93	7	-	18	50	7	29	25	7	43	14	-	25
11	72	28	-	31	55	3	28	7	24	24	14	24	13
12	72	29	-	10	62	19	19	38	33	38	33	19	19
13	74	17	-	13	52	9	39	13	17	52	9	9	26
14	86	7	3	39	39	-	53	14	14	57	7	18	46
15	85	12	-	57	38	-	46	19	27	65	23	-	39
16	50	35	15	35	38	23	-	8	4	42	8	35	15
17	86	5	5	50	18	9	41	-	18	36	9	9	45
18	76	17	-	38	38	14	24	7	38	31	14	28	24
19	48	43	4	-	70	30	4	17	9	61	22	9	4
20	81	19	-	50	38	12	-	4	-	81	8	12	31
21	100	-	-	84	8	-	84	4	-	92	-	-	92
22	97	3	-	45	45	6	6	-	6	68	29	-	35
23	32	36	32	36	32	23	59	23	4	27	18	55	22
24	75	19	6	22	59	16	25	53	12	28	44	28	12
25	63	30	7	33	40	4	22	4	15	30	18	30	18
26	75	25	-	50	46	4	-	-	-	71	25	4	37
27	72	24	4	20	64	16	44	32	24	56	40	4	28
28	40	33	23	17	47	30	50	27	20	63	13	10	24
29	81	19	-	50	42	8	61	27	12	73	19	8	58
30	72	24	-	28	56	12	60	36	-	72	20	4	56
31	68	32	-	32	44	24	12	8	4	40	32	12	20
32	81	19	-	6	69	25	-	6	6	69	25	-	6

**- %age of the total respondents per school.

5.THE
TOT.ENV.

4.2. TEACHERS

5.2.
TEACHERS

	4.2.1.(*) Acoustics			4.2.2.(*) Noise Reduction			5.2.1.(**)
	A	BA	IA	A	BA	IA	A
Means	80	11	10	65	17	18	45
1	46	31	23	18	27	55	-
2	100	-	-	100	-	-	100
3	100	-	-	67	22	11	45
4	56	22	22	56	-	44	33
5	95	-	5	70	15	15	41
6	100	-	-	73	27	-	63
7	75	25	-	67	8	25	16
8	45	27	27	33	44	22	33
9	83	17	-	50	33	17	67
10	100	-	-	100	-	-	100
11	46	-	54	27	9	64	8
12	67	25	8	58	25	17	58
13	100	-	-	86	14	-	57
14	92	8	-	91	9	-	53
15	86	14	-	64	14	21	33
16	79	21	-	62	31	8	41
17	82	18	-	90	10	-	45
18	86	14	-	53	27	20	61
19	100	-	-	81	13	6	66
20	80	13	7	80	27	13	47
21	100	-	-	89	-	11	77
22	80	20	-	60	27	13	47
23	82	18	-	55	18	27	23
24	100	-	-	94	6	-	40
25	100	-	-	75	25	-	50
26	47	6	47	41	12	47	34
27	100	-	-	80	13	7	34
28	8	-	92	8	-	92	33
29	92	8	-	94	6	-	53
30	100	-	-	100	-	-	66
31	50	50	-	57	29	14	14
32	60	40	-	17	83	-	34

*-%age of the received responses per question per school.
**-%age of the total respondents per school
A-adequate, BA-barely adequate, IA-inadequate.

APPENDIX TWO

ATTITUDES

2.1. STUDENTS

	2.1.1.(*) Being in CR			2.1.2.(*) Remain in Sch.		
	like	don't know	dislike	glad	don't mind	sad
Means	66	20	15	17	39	44
1	66	20	14	11	46	46
2	57	25	18	4	59	37
3	45	29	26	6	32	62
4	87	14	-	14	46	40
5	23	44	33	3	7	90
6	87	14	-	23	64	13
7	66	13	17	8	35	57
8	47	30	23	29	53	18
9	84	16	-	6	61	33
10	36	43	21	4	48	48
11	69	10	20	45	48	7
12	86	9	5	14	19	67
13	70	21	9	4	48	48
14	79	14	7	-	22	78
15	46	46	8	4	62	34
16	39	11	50	4	27	69
17	87	14	-	38	52	10
18	83	3	14	17	21	62
19	87	4	9	22	35	43
20	31	43	27	-	15	85
21	89	12	-	8	48	44
22	71	19	10	39	32	29
23	50	18	32	14	28	58
24	75	22	3	6	72	22
25	60	7	33	56	33	11
26	54	21	25	17	29	54
27	84	-	16	20	48	32
28	50	17	30	7	24	69
29	92	8	-	58	38	4
30	80	16	-	28	40	32
31	64	32	4	24	16	60
32	81	19	-	25	44	31

*-%age of the received responses per question per school.

2.2. TEACHERS

	2.2.1.(*) Teach. Method			2.2.2.(*) Phys. Health			2.2.3.(*) Ment. Health			2.2.4.(**) Total
	A	BA	IA	A	BA	IA	A	BA	IA	A
Means	56	31	13	63	31	6	75	22	3	41
1	15	31	54	46	23	31	23	69	8	-
2	67	33	-	50	50	-	33	67	-	33
3	55	27	18	64	18	18	55	36	9	55
4	56	11	33	78	22	-	100	-	-	55
5	36	41	23	64	27	9	65	35	-	27
6	45	55	-	73	18	9	73	27	-	36
7	50	33	17	25	58	17	58	42	-	17
8	64	18	18	91	9	-	82	9	9	50
9	67	25	8	58	42	-	58	42	-	50
10	100	-	-	90	10	-	100	-	-	90
11	31	38	31	38	54	8	50	33	17	15
12	50	33	17	67	33	-	73	27	-	42
13	100	-	-	100	-	-	100	-	-	86
14	62	15	23	62	38	-	67	33	-	39
15	67	20	13	60	40	-	86	14	-	46
16	31	69	-	62	38	-	85	15	-	13
17	45	36	18	45	45	9	82	18	-	27
18	60	40	-	60	33	7	71	29	-	40
19	65	24	12	71	29	-	82	18	-	47
20	80	13	7	73	20	7	93	7	-	53
21	75	25	-	100	-	-	100	-	-	66
22	40	53	7	47	47	7	80	13	7	40
23	75	8	17	54	38	8	70	20	10	23
24	42	26	32	55	30	15	89	11	-	35
25	100	-	-	75	-	25	100	-	-	75
26	18	71	12	39	61	-	82	12	6	11
27	53	47	-	67	33	-	80	20	-	46
28	58	25	17	58	33	8	50	33	17	50
29	82	18	-	71	29	-	94	6	-	59
30	83	17	-	83	8	8	83	17	-	67
31	67	33	-	71	29	-	67	33	-	43
32	50	33	17	67	17	17	80	-	20	50

*-%age of the received presponses per question per school.
**-%age of the total respondents per school.
A-adequate, BA-barely adequate, IA-inadequate.

APPENDIX 3. RELATIONSHIPS BETWEEN RESPONSES TO ENVIRONMENTAL FACTORS

1. STUDENTS 1.1. THE SPATIAL ENVIRONMENT	NO. OF SCH.S	AVE.	NO. OF STUDENTS (28)		AREA / STUDENT sq. ft. (26)		AREA 'as it is' % (44)	
NO. OF SCH.S			9 10		8 9		8 8	
AVE.			33 23.5		32.25 22		74 18.5	
AREA sq. ft.	8	810	0.600 0.967	29.5	0.433* 0.999	28	0.253* 0.995	36.25
	9	665		26		24.75		51
			0.891		0.991		0.964	
(725)			750 640		770 705		710 750	
NO. OF STUD.	9	33			0.926 0.970	23	0.414* 0.999	34.5
	10	23.5				31		53
					0.952		0.995	
(28)					24.25 32.5		25.75 29.5	
AREA / STUD.	8	32.25					0.154* 0.999	51
	9	22						39
							0.874	
(26)							27.75 25.75	

NOTE: This & all the similar tables are read in the following manner:

The 9 CRs with max. ave. no. of students (33) have an ave. area of 750 sq. ft., while the 10 CRs with min. ave. no. of students (23.5) have an ave. area of 640 sq. ft; the r^2 of the relationship is 0.891. Conversely, the 8 CRs with max. ave. area (810) have an ave. of 29.5 students, while the 9 CRs with min. ave. area (665) have an ave. of 26 students; the r^2 of the relationship is 0.967. The r^2 of both relationships is 0.600

- The averages of all 32 schools are given between brackets with each question.
- Non-significant ($p > .05$) r^2s are marked by an asterisk.
- The significance of r^2 is checked from G. Fergusson's book - Elem. statistics.

1. STUDENTS 1.2. THE THERMAL ENVIRONMENT	NO. OF SCH.S	AVE.	TEMPERATURE 'as it is' % (66)		
NO. OF SCH.S			8	8	
AVE.			85	47	
AREA sq. ft.	8 9	810 665	0.572 0.990	0.997	54 73
(725)			700	760	
NO. OF STUD.	9 10	33 23.5	0.668 0.986	0.974	56 71
(28)			24.25	30.5	
AREA/STUD. sq. ft.	8 9	32.25 22	0.216* 0.911	0.634*	66 58.25
(26)			28.5	25.25	
AREA 'as it is' %	8 8	74 18.5	0.124* 0.838	0.909	70.5 65
(44)			55	42.5	

1. STUDENTS 1.3. THE LUMINOUS ENVIRONMENT	NO. OF SCH.S	AVE.	LIGHT ON DESK 'as it is' % (49)		LIGHT ON BRD 'as it is' % (44)		LIGHT IN CR 'as it is' % (61)	
NO. OF SCH.S	Φ		9	8	8	8	9	8
AVE.			72	27.25	67.5	24	77.5	42.25
FT- CNDLES ON DESKS	7	188	0.194*	55.5			0.241*	64.5
	8	52.5	0.988 0.810	42.25			0.972 0.999	56.5
(109)			111.5 86				128 87	
FT- CNDLES ON BOARDS	7	128.5			0.216*	55.5	0.344*	67.5
	9	24			0.964 0.968	41.25	0.994 0.680	56
(62.5)					74 57.5		101 64.25	
TEMPERATURE 'as it is' %	8	85						(X)
	8	47					0.795	
(66)							75 65	

X. Wherever only one side of the square is filled, the relationship in the other side has been found too weak to be considered.
If the whole square is blank, either there is no relationship at all, or it has been shown elsewhere.

Φ 'No. of Schools' stands also for 'No. of Classrooms' since a sample of one CR (highest grade) is taken from each school.

1.3. THE LUM. ENV. (cont.)	NO. OF SCH.S	AVE.	AREA 'as it is' % (44)		
NO. OF SCH.S			8	8	
AVE.			74	18.5	
FT_CNDLES ON DESKS (109)	7 8	188 52.5		0.897	52 43
FT_CNDLES ON BRDS (62.5)	7 9	128.5 24		0.887	56 44
LIGHT ON DSK 'as it is' % (49)	9 8	72 27.25	0.357* 0.970	0.824	55 43
			57	36.5	
LIGHT ON BRD 'as it is' % (44)	8 8	67.5 24	0.477 0.997	0.996	54 37
			55	33	
LIGHT IN CR 'as it is' % (61)	9 8	77.5 42.25	0.648 0.963	0.994	56.5 33
			69	47.5	

1.3. THE LUM. ENV. (cont.)	NO. OF SCH.S	AVE.	AREA 'as it is' % (44)		
NO. OF SCH.S			8	8	
AVE.			74	18.5	
LIGHT (TOTAL) 'as it is' % (28)	8 8	48.5 9.5	0.519 0.989	0.855	48 25
			39.5	14	

1. STUDENTS 1.4. THE AURAL ENVIRONMENT	NO. OF SCH.S	AVE.	HEAR TEACHERS 'very well' % (71)		HEAR ALL 'very well' % (29)	
NO. OF SCH.S			8 8		9 8	
AVE.			90 43.75		52.25 8.5	
AREA sq. ft	8	810			0.977	21.5
	9	665				38
(725)						
NO. OF STUD.	9	33	0.952	69	0.955	21.5
	10	23.5		75		32
(28)						
AREA/STUD. sq. ft.	8	32.25	0.960	76		
	9	22		64.5		
(26)						
AREA 'as it is' %	8	74	0.306* 0.964	77	0.680 0.998	45
	8	18.5	0.993	61	0.999	17
(44)			51 36.5		57 33.5	

1. STUDENTS 1.4 THE AURAL ENV. (cont.).	NO. OF SCH.S	AVE.	HEAR TEACHERS 'very well' % (71)		HEAR ALL 'very well' % (29)	
NO. OF SCH.S			8 8		9 8	
AVE.			90 43.75		52.25 8.5	
TEMP. 'as it is' %	8	85				
	8	47			0.780	
(66)					73.75 66	
LIGHT IN CR 'as it is' %	9	77.5	0.808	79	0.686	41.5
	8	42.25	0.976	55	0.993	18.25
			0.979		0.967	
(61)			75.5 48.5		74.5 55	
LIGHT (TOTAL) 'as it is' %	8	48.5	0.396*	77	0.568	36.25
	8	9.5	0.979	62	0.961	15.75
			0.982		0.987	
(28)			36 20.75		39 21.5	

2. TEACHERS 2.1. THE SPATIAL ENVIRONMENT	NO. OF SCH.S	AVE.	AREA 'adequate' % (51)		
NO. OF SCH.S			8	8	
AVE.			84.5	19	
NO. OF STUD. 'adequate' %	8	91.5	0.698	0.995	64.5
	6	24	0.992		27
(63)			78	43.75	
STORAGE 'adequate' %	9	74	0.714	1.00	68.5
	8	16.5	0.998		37
(42)			61.5	25.5	

2. TEACHERS 2.3. THE LUM. ENVIRONMENT	NO. OF SCH.S	AVE.	WINDOWS 'adequate' % (74)		
NO. OF SCH.S			8	8	
AVE.			95.5	49.5	
LIGHTING 'adequate' %	11	100	0.302*	0.978	81
	7	67.5	0.976		66
(89)			95	85	

2. TEACHERS 2.2: THE THERM. ENVIRONMENT	NO. OF SCH.S	AVE.	TEMPERATURE 'adequate' % (62)		VENTILATION 'adequate' % (58)	
NO. OF SCH.S			8 6		8 7	
AVE.			88.25 33		88.5 26.5	
TEMPERATURE 'adequate' %	8 6	88.25 33			0.904 0.998 0.996	77 34.5
(62)					81 38	
AREA sq. ft.	8 11	810 665	0.999	78 50	0.995	69 51.5
(725)						
NO. OF STUD. 'adequate' %	8 6	91.5 24	0.231* 0.956 0.833	73.5 54.5	0.032* 0.272* 0.786	68 62
(63)			75 61		71 62.5	
WINDOWS 'adequate' %	8 8	91.5 49.5			0.144* 0.639* 0.998	69 59
(74)					80 68.5	

2. TEACHERS 2.4. THE AURAL ENVIRONMENT	NO. OF SCH.S	AVE.	ACOUSTICS 'adequate' % (80)		NOISE REDUCTION 'adequate' % (65)	
NO. OF SCH.S			11 8		8 8	
AVE.			100 44.75		95 31	
ACOUSTICS 'adequate' %	11 8	100 44.75			0.932 0.996 0.983	86 35.5
(80)					95 53	
AREA 'adequate' %	8 8	84.5 19	0.532 0.999 0.997	93 68	0.515 0.998 0.934	81 47.5
(51)			59.5 32.75		66.5 44.25	
NO. OF STUD. 'adequate' %	8 6	91.5 24	0.989	91.5 69	0.163* 0.887 0.507*	82 58.5
(63)					74 65.5	

2. TEACHERS 2.4. THE AURAL ENV. (cont.)	NO. OF SCH.S	AVE.	ACOUSTICS 'adequate' % (80)			NOISE REDUCTION 'adequate' % (65)		
NO. OF SCH.S			11	8		8	8	
AVE.			100	44.75		95	31	
THERM. ATM. 'adequate' %	8	88.25	0.171*	0.974	84			
	6	33	0.645		72			
(62)			76.5	61.25				
VENTILATION 'adequate' %	8	88.5				0.191*	0.836	63.5
	7	26.5				0.918		77.5
(58)						55	69.5	
LIGHTING 'adequate' %	11	100	0.110*	0.930	84	0.028*	0.999	69
	7	67.5	0.964		77	0.041*		57
(89)			90.5	82.5		94	87	

APPENDIX FOUR

SOME CHARACTERISTICS OF THE CLASSROOMS

1. DISTRIBUTION OF SCHOOLS ACCORDING TO GROUPINGS:

1.1. NO. OF STUDENTS AND SEATING ARRANGEMENT

	Conventional	Semi-Conven.	Active	TOTAL
16-26	8	-	4	12
27-30	6	2	3	11
31-35	6	2	1	9
TOTAL	20	4	8	32

1.2. NO. OF STUDENTS AND CLASS TYPE

	Fixed Partit.s.	Oper.Partit.s.	No Partit.s	TOTAL
16-26	11	-	1	12
27-30	6	3	2	11
31-35	9	-	-	9
TOTAL	26	3	3	32

1.3. CLASS TYPE AND SEATING ARRANGEMENT

	Conventional	Semi-Conven.	Active	Total
FP	18	2	6	26
OP	2	1	-	3
NP	-	1	2	3
TOTAL	20	4	8	32

2. RESPONSES ACCORDING TO GROUPINGS

2.1. STUDENTS

* Chi Sq.not calculated

2.1.1.

No. of Students/CR

		16-26	27-30	31-35	
No. of students in the category		259	293	265	
1. THE SPATIAL ENVIRONMENT					
I-	Area in sq.ft.(*)	715	715	750	
II-	No. of students (*)	24	29	32.5	
III-	Area/St. in sq.ft.(*)	30	25	23	
IV-	Area, 'as it is' %	54	45	34	$p < .01$
V-	Sitting place, satisfied % (*)	48	48	50	
2. THE THERMAL ENVIRONMENT					
I-	Effective temperature, F (*)	69	68	69	
II-	Temp., 'as it is' %	72	70	56	$p < .01$
3. THE LUMINOUS ENVIRONMENT					
I-	Light on desk, 'as it is' %	67	59	53	
II-	" " brd., " "	65	56	51	
III-	" in CR, " "	69	67	68	
IV-	Total light " " (*)	30	30	23	
4. THE AURAL ENVIRONMENT					
I-	Hear teachers, 'very well'%	77	69	73	$p < .05$
II-	Total hearing " "(*)	36	29	22	
5. ATTITUDES					
I-	Being in CR, 'like' %	79	60	59	$p < .001$
II-	Remain in sch., 'glad'%	18	18	15	

2.1.2. Seating Arrangement				2.1.3. Class Type			
Conv.	Semi-Conv.	Active		FP	OP	NP	
503	116	198		664	76	77	
730	700	725		740	670	685	
27.5	32	28		28	28	28	
26.5	22	26		26.5	24	24.5	
42	47	46		41	61	56	p<·01
50	43	45.5		47.5	58	41.5	
70	68	67		69	69	68	
66	58	70	p≃.05	66	59	71	p≃·05
57	59	63		59	55	63	
51	62	67		56	54	64	
66	69	70		68	61	70	
23	34	35		27	27	31	
76	69	67		76	69	46	p<·001
30	30	25		29	43	13	
67	66	62	p≃·05	65	75	57	
17	16	18		17	24	13	

2.2. TEACHERS

2.2.3.

% of 'adequate' responses

Class Type

(*) Chi Sq. not calculated

	FP	OP	NP	
No. of teachers in the category	320	43	36	
1. THE SPATIAL ENVIRONMENT				
I- Area	49	78	37	$p < .01$
II- No. of students	63	66	63	
III- Storage	46	34	20	$p < .05$
IV- Windows	75	66	74	$p < .02$
2. THE THERMAL ENVIRONMENT				
I- Thermal Atmosphere	65	38	62	$p < .05$
II- Ventilation	59	49	63	
3. THE LUMINOUS ENVIRONMENT				
I- Lighting	89	84	94	
II- Colours	77	84	91	
4. THE AURAL ENVIRONMENT				
I- Acoustics	83	89	43	$p < .001$
II- Noise Reduction	66	82	36	$p < .001$
5. THE TOTAL ENVIRONMENT				
I- Total Environment (*)	48	45	29	
6. ATTITUDES				
I- For Teaching Method	54	74	57	
II- For Physical Health	63	63	57	
III- For Mental Health	76	79	63	
IV- Total of I,II,III together(*)	41	42	39	

APPENDIX 2. RELATIONSHIPS BETWEEN ATTITUDES AND RESPONSES TO ENVIRONMENTAL FACTORS

1. STUDENTS 1.0. ATTITUDES	NO. OF SCH.S	AVE.	BEING IN THE CR 'like' % (66)		
NO. OF SCH.S			9	9	
AVE.			87	40.75	
REMAIN IN SCH. 'glad' % (17)	8 8	39.75 3	0.530 0.992	0.865	73.5 47.5
			22.5	8	

3. ST & T 3.0. ATTITUDES	NO. OF SCH.S	AVE	BEING IN THE CR 'like' % (66)		
NO. OF SCH.S			9	9	
AVE.			87	40.75	
TOTAL 'adequate' % (41)	8 8	69 16.5	0.104* 0.084*	0.923	70 56
			47.5	45.25	

2. TCHRS 2.0. ATTITUDES	NO. OF SCH.S	AVE.	TEACHING METHOD 'adequate' % (56)			PHYSICAL HEALTH 'adequate' % (63)		
NO. OF SCH.S			8	7		9	7	
AVE.			87	30.5		85	41.5	
PHYS. HEALTH 'adeq.' % (63)	9 7	85 41.5	0.885 0.998	0.997	78 38			
			80.75	50.25				
MENT. HEALTH 'adeq.' % (75)	8 7	97 46.75	0.578 0.990	0.867	79.25 49	0.876 0.999	0.985	80.25 48.6
			92.5	67.75		92.75	58.25	

See 'NOTE' at Appendix 3

1. STUDENTS 1.1. THE SPATIAL ENVIRONMENT	NO. OF SCH.S	AVE.	AREA sq. ft. (725)			NO. OF STUDENTS (28)			AREA / STUDENT sq. ft. (26)		
NO. OF SCH.S			8	9		9	10		8	9	
AVE.			810	665		33	23.5		32.25	22	
BEING IN THE CR 'like' % (66)	9	87	0.574	0.998	700	0.591	0.972	25	0.143*	0.833	28.5
	9	40.75	0.990		760	0.952		30	0.560*		25.5
			54	78		58.75	80.5		65.5	60	
REMAIN IN SCH. 'glad' % (17)	8	39.75	0.578	0.869	700	0.173*	0.952	26.5			
	8	3	0.983		785	0.989		30			
			10	24.75		15	18.25				

1. STUDENTS 1.1. THE SPATIAL ENV. (cont.).	NO. OF SCH.S	AVE.	AREA 'as it is' % (44)		
NO. OF SCH.S			8	8	
AVE.			74	18.5	
BEING IN THE CR 'like' % (66)	9	87	0.368*	0.990	52.5
	9	40.75	0.994		36.75
			77	58.75	
REMAIN IN SCH. 'glad' % (17)	8	39.75	0.579	0.998	64
	8	3	0.997		33.5
			24	10	

1. STUDENTS 1.2. THE THERMAL ENVIRONMENT	NO. OF SCH.S	AVE.	TEMPERATURE 'as it is' % (66)	
NO. OF SCH.S			8 8	
AVE.			85 47	
BEING IN THE CR 'like' %	9 9	87 40.75	0.060* 0.981 0.337*	70 63
(66)			72 68.5	
REMAIN IN SCH. 'glad' %	8 8	39.75 3	0.203* 0.998 0.914	72 62.75
(17)			23.5 15	

1. STUDENTS 1.4. THE AURAL ENVIRONMENT	NO. OF SCH.S	AVE.	HEAR TEACHERS 'Very well' % (71)		HEAR ALL 'very well' % (29)	
NO. OF SCH.S			8 8		9 8	
AVE.			90 43.75		52.25 8.5	
BEING IN THE CR 'like' %	9 9	87 40.75	0.512 0.985 0.919	78.5 57	0.466 0.981 0.976	41 20
(66)			68.5 51		76 61	

1. STUDENTS 1.3. THE LUMIN. ENVIRONMENT	NO. OF SCH.S	AVE.	FT-CANDLES ON DESKS (109)		FT. CANDLES ON BOARDS (62.5)		LIGHT (TOTAL) 'as it is' % (28)	
NO. OF SCH.S			7	8	7	9	8	8
AVE.			188	52.5	128.5	24	48.5	9.5
BEING IN THE CR 'like' %	9	87	0.960	117	0.172* 0.984 0.780	78	0.047* 0.794 0.938	28
	9	40.75		88		50.5		24.75
(66)					74 67		70.5 64.5	
REMAIN IN SCH. 'glad' %	8	39.75	0.862	115	0.835	66		
	8	3		94		52		
(17)								

1. STUDENTS 1.3. THE LUMIN. ENV. (cont.).	NO. OF SCH.S	AVE.	LIGHT ON DESK 'as it is' % (49)		LIGHT ON BOARD 'as it is' % (44)		LIGHT IN CR 'as it is' % (61)	
NO. OF SCH.S			9	8	8	8	9	8
AVE.			72	27.25	67.5	24	77.5	42.25
BEING IN THE CR 'like' %	9	87	0.175* 0.990 0.958	52.5	0.096* 0.999 0.962	47	0.172* 0.999 0.625	66.25
	9	40.75		43		40		55
(66)			69.5 59		71 64		73 66.75	

2. TEACHERS 2.1. THE SPATIAL ENVIRONMENT	NO. OF SCH.S	AVE.	AREA 'adequate' % (51)		NO. OF STUDENTS 'adequate' % (63)	
NO. OF SCH.S			8 8		8 6	
AVE.			84.5 19		91.5 24	
TEACHING METHOD 'adequate' %	8 7	87 30.5	0.869 0.999 0.997	76.75 29.5	0.696 0.999 0.975	79 48.5
(56)			76.5 39.75		78 40.25	
PHYSICAL HEALTH 'adequate' %	9 7	85 41.5	0.550 0.905 0.988	57 30.5	0.544 0.998 0.956	76.25 48.5
(63)			76 54.5		80.5 50	
MENTAL HEALTH 'adequate' %	8 7	97 46.75	0.372* 0.992 0.988	63 39.5	0.219* 0.996 0.955	69.5 56.25
(75)	.		85 68.5		83 64	
TOTAL 'adequate' %	8 8	69 16.5	0.709 0.995 0.992	67 33.5	0.622 0.985 0.965	75 47
(41)			59 28.25		60.5 28.25	

2. TEACHERS 2.1. THE SPATIAL ENVIRON. (cont.)	NO. OF SCH.S	AVE.	STORAGE 'adequate' % (42)		WINDOWS 'adequate' % (74)	
NO. OF SCH.S			9 8		8 8	
AVE.			74 16.5		95.5 49.5	
TEACHING METHOD 'adequate' % (56)	8 7	87 30.5	0.499 0.998 0.958	54.5 30.5	0.063* 0.957 0.580*	79.5 72
			73 50		62.5 57	
PHYSICAL HEALTH 'adequate' % (63)	9 7	85 41.5	0.495 0.997 0.992	54 28.25		
			73.25 57			
MENTAL HEALTH 'adequate' % (75)	8 7	97 46.75	0.140* 0.951 0.906	48 38.5	0.075* 0.875 0.510*	80.25 72
			78.25 66.75		84 77	
TOTAL 'adequate' % (41)	8 8	69 16.5	0.603 0.999 0.975	58.5 28		
			56.5 34.25			

2. TEACHERS 2.2. THE THERM. ENVIRONMENT	NO. OF SCH.S	AVE.	THERM. ATM. 'adequate' % (62)		VENTILATION 'adequate' % (58)	
NO. OF SCH.S			8 6		8 7	
AVE.			88.25 33		88.5 26.5	
TEACHING METHOD 'adequate' %	8 7	87 30.5	0.138* 0.913 0.874	64 57		
(56)			68 53			
PHYSICAL HEALTH 'adequate' %	9 7	85 41.5	0.408* 0.929 0.975	78 56.5	0.349* 0.883 0.871	74 54.5
(63)			72.5 57		77 60	
MENTAL HEALTH 'adequate' %	8 7	97 46.75			0.021* 0.343* 0.438*	69.5 62
(75)					79.75 76.5	
TOTAL 'adequate' %	8 8	69 16.5	0.555 0.968 0.999	71.75 46	0.192* 0.945 0.774	63 47.75
(41)			52.25 29.25		52 40.5	

2. TEACHERS 2.3. THE LUM. ENVIRONMENT	NO. OF SCH.S	AVE.	LIGHTING 'adequate' % (89)			COLOURS 'adequate' % (79)		
NO. OF SCH.S			11	7		9	8	
AVE.			100	67.5		100	56	
TEACHING METHOD 'adequate' %	8	87				0.212* 0.995 0.747		88
	7	30.5						73.25
(56)						65	55.75	
PHYSICAL HEALTH 'adequate' %	9	85				0.277* 0.974 0.726		89
	7	41.5						73.5
(63)						74	63	
MENTAL HEALTH 'adequate' %	8	97	0.110* 0.988 0.577*		92	0.122* 0.685 0.976		88.5
	7	46.75			83.25			79
(75)			81	75		80.5	71.5	
TOTAL 'adequate' %	8	69				0.176* 0.942 0.650		88
	8	16.5						76
(41)						52	42	

2. TEACHERS 2.4. THE AURAL ENVIRONMENT	NO. OF SCH.S	AVE.	ACOUSTICS 'adequate' % (80)		NOISE REDUCTION 'adequate' % (65)		2. TEACHERS 2.5. THE TOTAL ENV. 'adeq.' % (45)	
NO. OF SCH.S			11 8		8 8		8 9	
AVE.			100 44.75		95 31		75 17.75	
TEACHING METHOD 'adeq.' %	8 7	87 30.5	0.387* 0.997 0.786	94 70.5	0.573 0.992 0.988	84.75 53	0.461 0.994 0.869	59 30.25
(56)			71 52		69.5 45.5		70.25 53.75	
PHYSICAL HEALTH 'adeq.' %	9 7	85 41.5	0.152* 0.975 0.161*	87 68	0.293* 0.984 0.996	77 57.5	0.426* 0.991 0.973	58.5 35.5
(63)			75 68.5		69.5 57		73 58	
MENTAL HEALTH 'adeq.' %	8 7	97 46.75	0.359* 0.999 0.975	91 65.5	0.586 0.988 0.970	84.25 48	0.231* 0.942 0.725	57 38.5
(75)			81 69		81 62		75 65	
TOTAL 'adeq.' %	8 8	69 16.5	0.353* 0.999 0.603*	93.5 69	0.481 0.991 0.981	83 53.75	0.568 0.998 0.988	60 29.75
(41)			57.75 41		52 33.25		53.5 33.25	

	OPENING YEARS						SEATING		
	1	2	3	4	5	6	C	SC	A
1						+		*	
2		+					x		
3			+				x		
4						+	x		
5		+							x
6					+		x		
7						+			x
8						+			x
9				+			x		
10			+				x		
11					+			x	
12	+								x
13		+							x
14						+		x	
15		+					x		
16						+	x		
17						+	x		
18					+		x		
19						+	x		
20					+		x		
21						+			x
22		+					x		
23						+	x		
24						+	x		
25						+			x
26		+					x		
27		+					x		
28						+		x	
29						+	x		
30				+			x		
31		+							x
32			+				x		

1. 1951-53
2. 1954-56
3. 1957-59
4. 1960-62
5. 1963-65
6. 1966-1968

APPENDIX SIX

CULTURAL, SOCIAL & OTHER FACTORS

1. DISTRIBUTION OF SCHOOLS ACCORDING TO LANGUAGE, INCOME LEVEL, LOCATION, GRADE AND OPENING YEAR

1.1. LANGUAGE

1. LANGUAGE & INCOME LEVEL

	Lower	Lower-Middle	Middle	Upper	TOTAL
English	-	5	6	5	16
French	4	4	5	3	16
TOTAL	4	9	11	8	32

2. LANGUAGE AND LOCATION

	Urban	Semi-Urban	Suburban	TOTAL
English	3	7	6	16
French	4	6	6	16
TOTAL	7	13	12	32

3. LANGUAGE AND GRADE

	Fifth	Sixth	Seventh	TOTAL
English	-	6	10	16
French	1	5	10	16
TOTAL	1	11	20	32

4. LANGUAGE AND OPENING YEAR

	1951 - 56	1957 - 62	1963 - 68	1951 - 59	1960 - 68	1951 - 65	1966 - 68
English	5	3	8	7	9	10	6
French	4	2	10	5	11	8	8
TOTAL	9	5	18	12	20	18	14

5. LANGUAGE AND NO. OF ST./CR

	16-26	27-30	31-35	TOTAL
English	6	4	6	16
French	6	7	3	16
TOTAL	12	11	9	32

6. LANGUAGE AND CLASS TYPE

	FP	OP	NP	TOTAL
English	13	1	2	16
French	13	2	1	16
TOTAL	26	3	3	32

7. LANGUAGE AND SEATING ARRANGEMENT

	Conventional	Semi-Conven.	Active	TOTAL
English	8	3	5	16
French	12	1	3	16
TOTAL	20	4	8	32

1.2. INCOME LEVEL

1. INCOME LEVEL AND LOCATION

	Urban	Semi-Urban	Suburban	TOTAL
Lower	3	-	1	4
Lower Middle	2	4	3	9
Middle	1	6	4	11
Upper	1	3	4	8
TOTAL	7	13	12	32

2. INCOME LEVEL AND GRADE

	Fifth	Sixth	Seventh	TOTAL
Lower	1	1	2	4
Lower Middle	-	2	7	9
Middle	-	4	7	11
Upper	-	4	4	8
TOTAL	1	11	20	32

3. INCOME LEVEL AND OPENING YEAR

	1951 - 56	1957 - 62	1963 - 68	1951 - 59	1960 - 68	1951 - 65	1966 - 68
Lower	1	-	3	1	3	1	3
Lower Middle	3	3	3	5	4	7	2
Middle	2	1	8	2	9	6	5
Upper	3	1	4	4	4	4	4
TOTAL	9	5	18	12	20	18	14

4. INCOME LEVEL & NO. OF ST./CR

	16-26	27-30	31-35	TOTAL
Lower	1	2	1	4
Lower Middle	3	3	3	9
Middle	5	4	2	11
Upper	3	2	3	8
TOTAL	12	11	9	32

5. INCOME LEVEL & CLASS TYPE

	FP	OP	NP	TOTAL
Lower	2	2	-	4
Lower Middle	7	-	2	9
Middle	10	-	1	11
Upper	7	1	-	8
TOTAL	26	3	3	32

6. INCOME LEVEL & SEATING ARRANGEMENT

	Conv.	Semi-Conv.	Active	TOTAL
Lower	4	-	-	4
Lower Middle	7	1	1	9
Middle	6	1	4	11
Upper	3	2	3	8
TOTAL	20	4	8	32

1.3. LOCATION

1. LOCATION AND GRADE

	Fifth	Sixth	Seventh	TOTAL
Urban	1	2	4	7
Semi-Urban	-	7	6	13
Suburban	-	2	10	12
TOTAL	1	11	20	32

2. LOCATION AND OPENING YEAR

	1951 - 56	1957 - 62	1963 - 68	1951 - 59	1960 - 68	1951 - 65	1966 - 68
Urban	4	-	3	4	3	4	3
Semi-Urban	2	4	7	5	8	8	5
Suburban	3	1	8	3	9	6	6
TOTAL	9	5	18	12	20	18	14

3. LOCATION AND NO. OF ST./CR

	16-26	27-30	31-35	TOTAL
Urban	2	4	1	7
Semi-Urban	7	3	3	13
Suburban	3	4	5	12
TOTAL	12	11	9	32

4. LOCATION AND CLASS TYPE

	FP	OP	NP	TOTAL
Urban	5	2	-	7
Semi-Urban	11	-	2	13
Suburban	10	1	1	12
TOTAL	26	3	3	32

5. LOCATION AND SEATING ARRANGEMENT

	Conventional	Semi-Conven.	Active	TOTAL
Urban	6	-	1	7
Semi-Urban	8	1	4	13
Suburban	6	3	3	12
TOTAL	20	4	8	32

1.4. GRADE

1. GRADE AND OPENING YEAR

	1951 - 56	1957 - 62	1963 - 68	1951 - 59	1960 - 68	1951 - 65	1966 68
Fifth	-	-	1	-	1	-	1
Sixth	1	2	8	3	8	5	6
Seventh	8	3	9	9	11	13	7
	9	5	18	12	20	18	14

2. GRADE & NO. OF ST./CR

	16-26	27-30	31-35	TOTAL
VI (& V)	6	3	3	12
VII	6	8	6	20
TOTAL	12	11	9	32

3. GRADE & CLASS TYPE

	FP	OP	NP	TOTAL
VI (& V)	9	2	1	12
VII	17	1	2	20
TOTAL	26	3	3	32

4. GRADE & SEATING ARRANGEMENT

	Conven.	Semi-Conven.	Active	TOTAL
VI (& V)	9	-	3	12
VII	11	4	5	20
TOTAL	20	4	8	32

1.5. OPENING YEAR

1. OPENING YEAR & NO. OF ST/CR

	16-26	27-30	31-35	TOTAL
1951-56	3	3	3	9
1957-62	3	1	1	5
1963-68	6	7	5	18
1951-59	4	4	4	12
1960-68	8	7	5	20
1951-65	7	5	6	18
1966-68	5	6	3	14

2. OPENING YEAR & CLASS TYPE

	FP	OP	NP	TOTAL
1951-56	9	-	-	9
1957-62	5	-	-	5
1963-68	12	3	3	18
1951-59	12	-	-	9
1960-68	14	3	3	20
1951-65	18	-	-	18
1966-68	8	3	3	14

3. OPENING YEAR & SEATING ARRANGEMENT

	Conven.	Semi-Conven.	Active	TOTAL
1951-56	5	-	4	9
1957-62	5	-	-	5
1963-68	10	4	4	18
1951-59	8	-	4	12
1960-68	12	4	4	20
1951-65	13	1	4	18
1961-68	7	3	4	14

3. COLOURS

3.1. COLOURS LIKED (percentages)

3.1.1. LANGUAGE

ENGLISH		FRENCH	
L.blue	35	White	41
L.green	24	L.blue	33
M.blue	22	L.green,M.blue	24
white	18	M.green	21
M.green	17	L.yellow	18

3.1.2. INCOME

Lower		Low. Middle		Middle		Upper	
L.blue	41	L.blue	33	L.blue	34	L.blue	32
white	39	white	26	L.green	30	white	29
L.green	25	M.green	19	white	29	M.blue	25
M.green	22	L.green	17	L.yellow	23	L.green	18
M.blue	21	D.green	17	M.blue	21	M.green	18

3.1.4. GRADE

VIth (& Vth)		VIIth	
white	32	L.blue	38
L.blue	27	- white	28
L.green	23	L.green	24
M.blue	21	M.blue	24
L.yellow	18	M.green	21

3.2. COLOURS DISLIKED (percentages)

3.2.1. LANGUAGE

ENGLISH		FRENCH	
D.red	42	D.red	47
D.purple	33	D.purple	29
D.grey	25	D.grey	27
D.orange	21	D.orange	24
L.yellow	17	M.grey	15

3.2.2. INCOME

Lower		Low. Middle		Middle		Upper	
D.red	53	D.red	39	D.red	46	D.red	43
D.purple	33	D.purple	24	D.purple	40	D.purple	30
D.grey	21	D.grey	21	D.grey	31	D.grey	29
D.orange	18	L.yellow	20	D.orange	27	D.orange	23
D.green	18	D.orange	18	M.grey	17	D.yellow	20

3.2.4. GRADE

VITH(& Vth)		VIIth	
D.red	39	D.red	47
D.purple	31	D.purple	31
D.grey	29	D.grey	25
D.orange	21	D.orange	23
L.yellow	16	M.grey	17

3.THE LUMINOUS ENVIRONMENT				5.ATTITUDES	
Light on desk, 'as it is', %	Light on brd, 'as it is', %	Light in CR 'as it is', %	Total light 'as it is, %(*)	'Being', 'like', %	'Remain', 'glad', %
63 p<.01	60	71 p<.01	29	60 p<.01	11 p<.001
55	54	64	26	71	23
56 p<.001	39 p<.001	55 p<.001	15	75 p=.05	35 p<.001
53	55	66	23	60	12
68	64	75	36	65	21
55	59	65	28	69	10
57 p<.05	52	57 p<.01	15	71 p=.001	20 p=.01
58	59	70	29	57	12
61	57	72	29	71	21
55	57	67 p<.05	28	66	16
61	56	68	27	65	18
62	51	62 p<.01	24	61 p<.01	15
53	57	73	24	62	13
58	60	69	30	69	19
59	49 p<.01	64 p<.01	22	58 p<.001	14 p<.05
59	61	70	31	70	19
58	56	67 p<.01	26	62 p<.01	16
60	58	69	30	70	19

2. STUDENT AND TEACHER RESPONSES

according to groupings

2.1. STUDENTS

		1.THE SPATIAL ENVIRONMENT					2.THE THERM. ENVIRONMENT		4.THE AUR. ENVIRON.	
No.of Students in the category		AREA, sq.ft(*)	No.of ST./CR(*)	AREA/ST.sq.ft. (*)	Area 'as it is', (%)	Sit.place, satisfied, (%)	EFF.TEMP.,F (*)	Temp.,'as it is' %	Hear Teacher, very well,%	Hear All 'very well',% (*)
2.1.1. LANGUAGE										
409	Eng.	750	28.5	26.5	38 p<.001	47	68	63	73	25
408	Fr.	700	27.5	25.5	50	49.5	70	69	73	32
2.1.2. INCOME LEVEL										
102	L	680	28	24	49	61	70	63 p<.001	68	32
231	LM	740	28.5	26	43	45	69	69	72	25
284	M	720	28	25.5	44	50	68	73	75	35
200	U	735	28	26	43	43.5	68	54	74	26
2.1.3. LOCATION										
171	Urb.	730	27	27	40	53	70	70	70	31
321	S/U	735	27.5	27	43	45	68	67	71	31
325	Sub.	710	30	23.5	47	47.5	68	63	76	25
2.1.4. GRADE										
286	V-VI	730	26.5	27.5	48	42	68	60 p<.001	70	30
531	VII	725	29	25	42	45.5	69	70	74	28
2.1.5. OPENING YEAR		(A)								
233	51-56	755	29	26	37 p<.01	45.5	69	65	78 p<.01	29
119	57-62	750	26	29	39	41	70	67	78	26
465	63-68	700	28.5	24.5	49	51.5	68	67	69	30
			(B)							
308	51-59	755	28	27	35 p<.001	43.5	68	65	77 p<.01	25
509	60-68	705	28	25	50	50	69	67	70	31
			(C)							
458	51-65	740	28	26.5	39 p<.001	44.5	69	66	78 p<.001	28
359	66-68	690	28	24.5	51	52.5	69	66	66	30

* - Chi Sq. not calculated.

5.TOT. ENV.	6. ATTITUDES			
TOTAL (*)	TEACH.METHOD	PHYS.HEALTH	MENT.HEALTH	TOTAL (*)
44	53 $p<.05$	63	68 $p<.01$	37
46	59	63	82	45
50	66	61	83	42
52	57	63	70	45
42	57	63	78	40
40	47	63	71	33
49	66 $p<.01$	64 $p<.01$	79	44
52	60	73	79	48
36	45	52	69	31
43	49 $p<.01$	60	75	38
66	73	73	74	63
40	56	62	75	37
48	53	63	76	44
44	58	63	75	39
49	56	63	74	43
41	56	62	76	37

2.2. TEACHERS

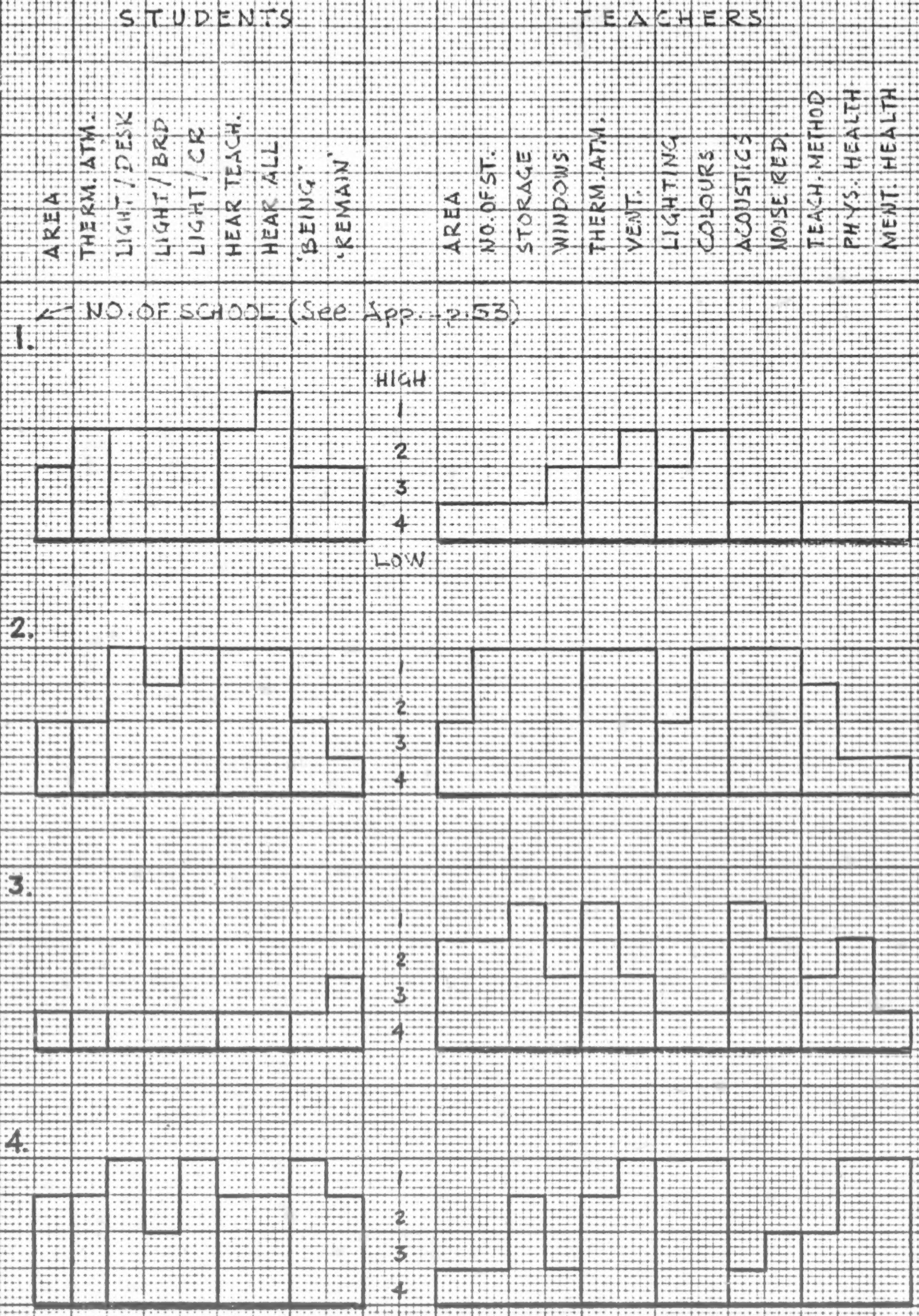
°/o 'adequate' responses

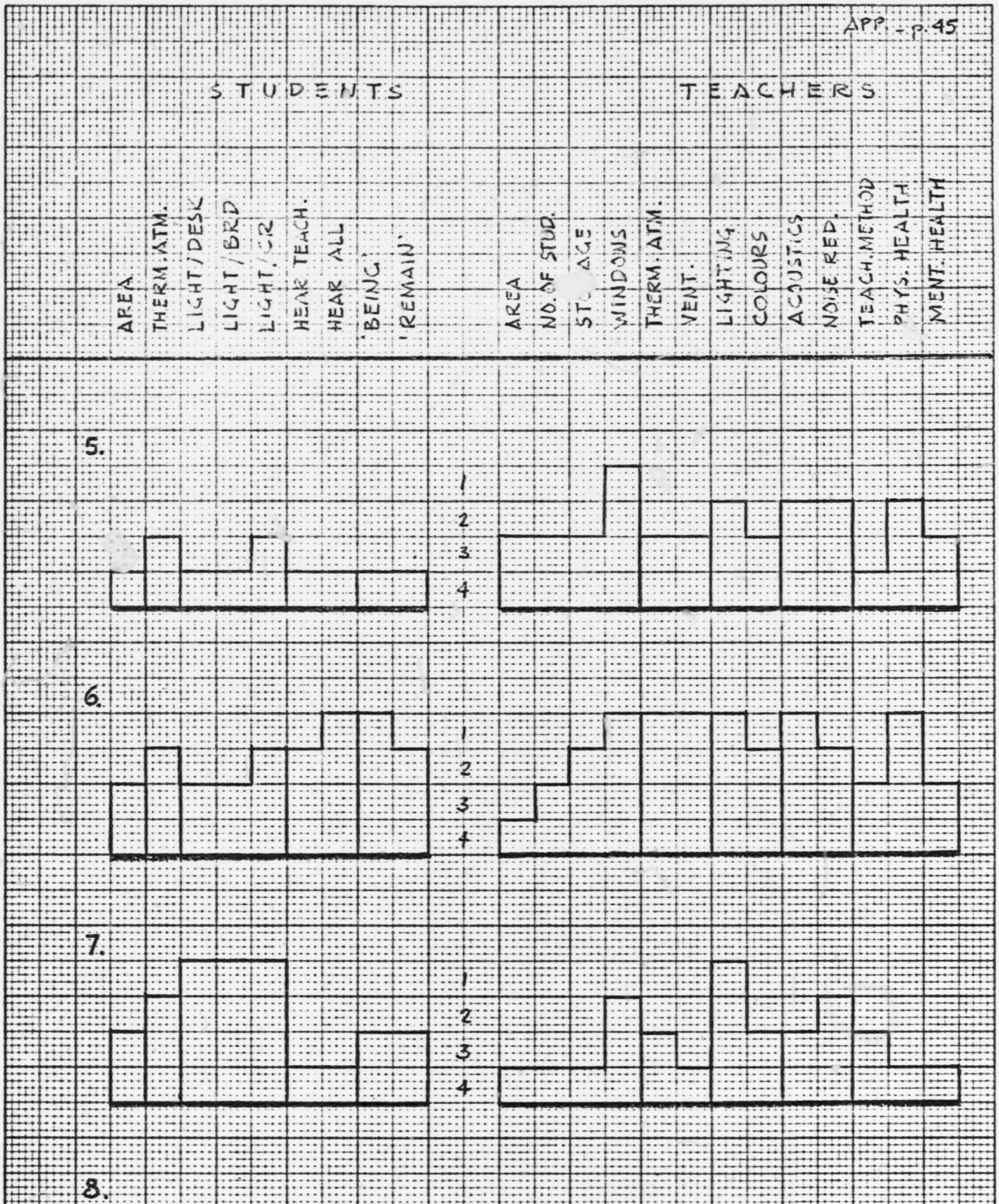
No. of Teachers in the category		1. THE SPATIAL ENV.				2. THE THERM. ENVIRONMENT		3. THE LUM. ENVIRON.		4. THE AUR. ENVIRON.	
		AREA	No. of STUDENTS	STORAGE	WINDOWS	THERM. ATM.	VENTILATION	LIGHTING	COLOURS	ACOUSTICS	NOISE REDUCT.
2.2.1. LANGUAGE											
193	Eng.	38 $p<.001$	60 $p<.01$	38	77	69 $p<.02$	67 $p<.001$	89	79	79	63
206	Fr.	64	66	47	70	55	49	88	79	80	68
2.2.2. INCOME LEVEL											
62	L	70 $p<.001$	65 $p<.02$	34 $p<.05$	69 $p<.001$	41 $p<.01$	42 $p<.02$	81	90 $p<.02$	89 $p<.01$	74 $p<.05$
111	LM	59	74	56	81	71	70	91	70	72	56
133	M	46	61	40	77	66	54	93	80	83	69
93	U	35	53	34	63	60	60	85	82	78	65
2.2.3. LOCATION											
95	Urb.	65 $p<.02$	70 $p<.001$	46 $p<.01$	74 $p<.01$	55	54	87	82 $p<.001$	90 $p<.01$	76 $p<.05$
153	S/U	51	71	47	80	68	60	89	87	81	66
151	Sub.	43	52	36	67	61	59	89	69	72	58
2.2.5. OPENING YEAR (A)											
117	51-56	43 $p<.01$	64 $p<.05$	39 $p<.01$	81	61	58	85	66 $p<.001$	81	65
51	57-62	75	80	66	71	72	55	84	84	92	71
231	63-68	50	59	39	71	61	59	91	85	76	64
(B)											
144	51-59	46	66	42	80 $p<.05$	65	60	83 $p<.05$	69 $p<.001$	83	66
255	60-68	54	62	43	70	60	57	92	85	78	65
(C)											
222	51-65	53	66	47	76	69 $p<.01$	60	86	70 $p<.001$	82	64
177	66-68	49	60	36	70	53	56	92	90	76	67

* - Chi Sq. not calculated.

APPENDIX SEVEN – COMPARISON OF THE SCHOOLS

1. RANKED POSITION OF THE SCHOOLS WITH RESPECT TO EACH QUESTION




STUDENTS
TEACHERS
AREA
THERM. ATM.
LIGHT/DESK
LIGHT/BRD
LIGHT/CR
HEAR TEACH.
HEAR ALL
'BEING'
'REMAIN'
AREA
NO. OF STUD.
STORAGE
WINDOWS
THERM. ATM.
VENT.
LIGHTING
COLOURS
ACOUSTICS
NOISE RED.
TEACH. METHOD
PHYS. HEALTH
MENT. HEALTH
5.
1
2
3
4
6.
1
2
3
4
7.
1
2
3
4
8.
1
2
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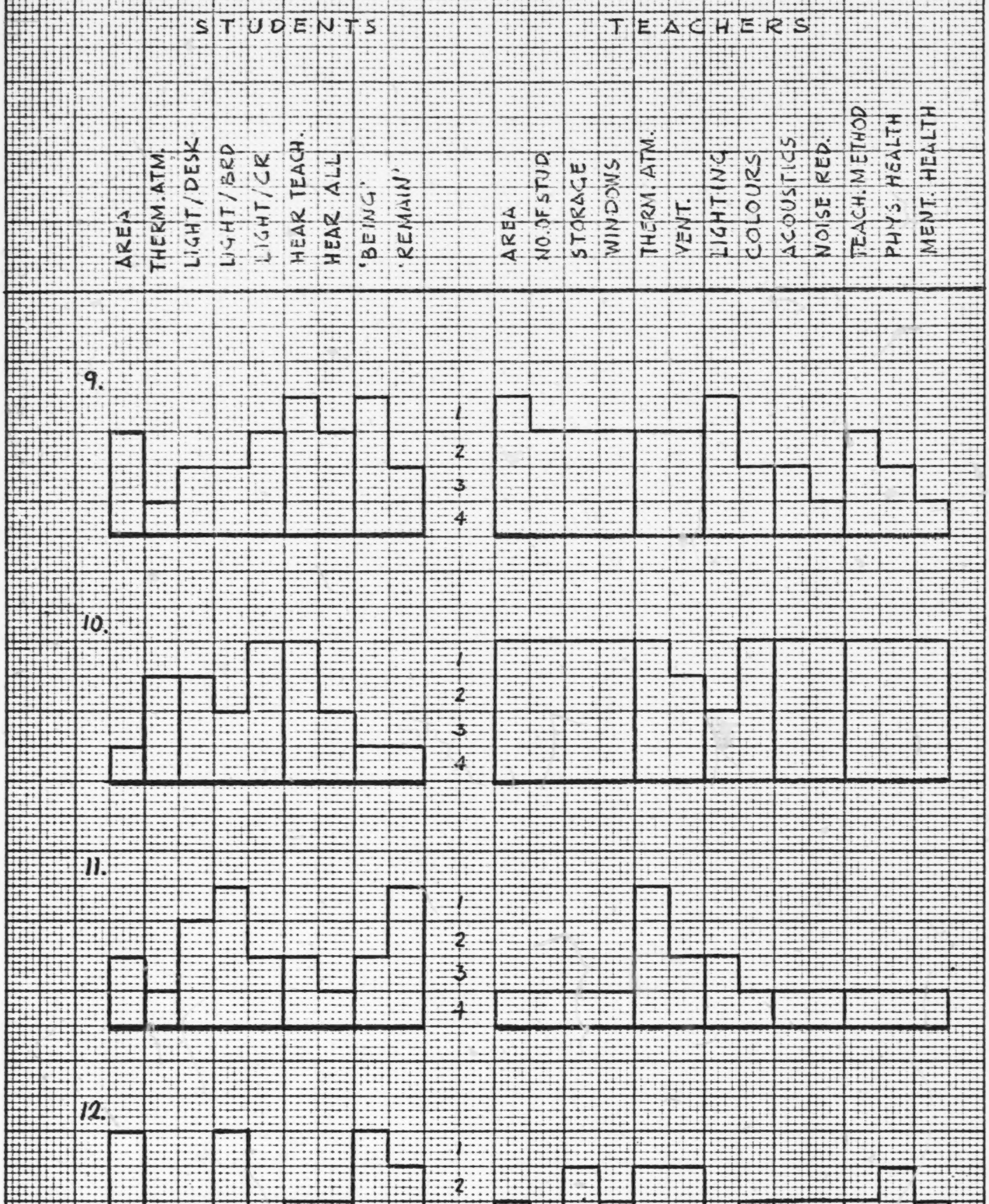
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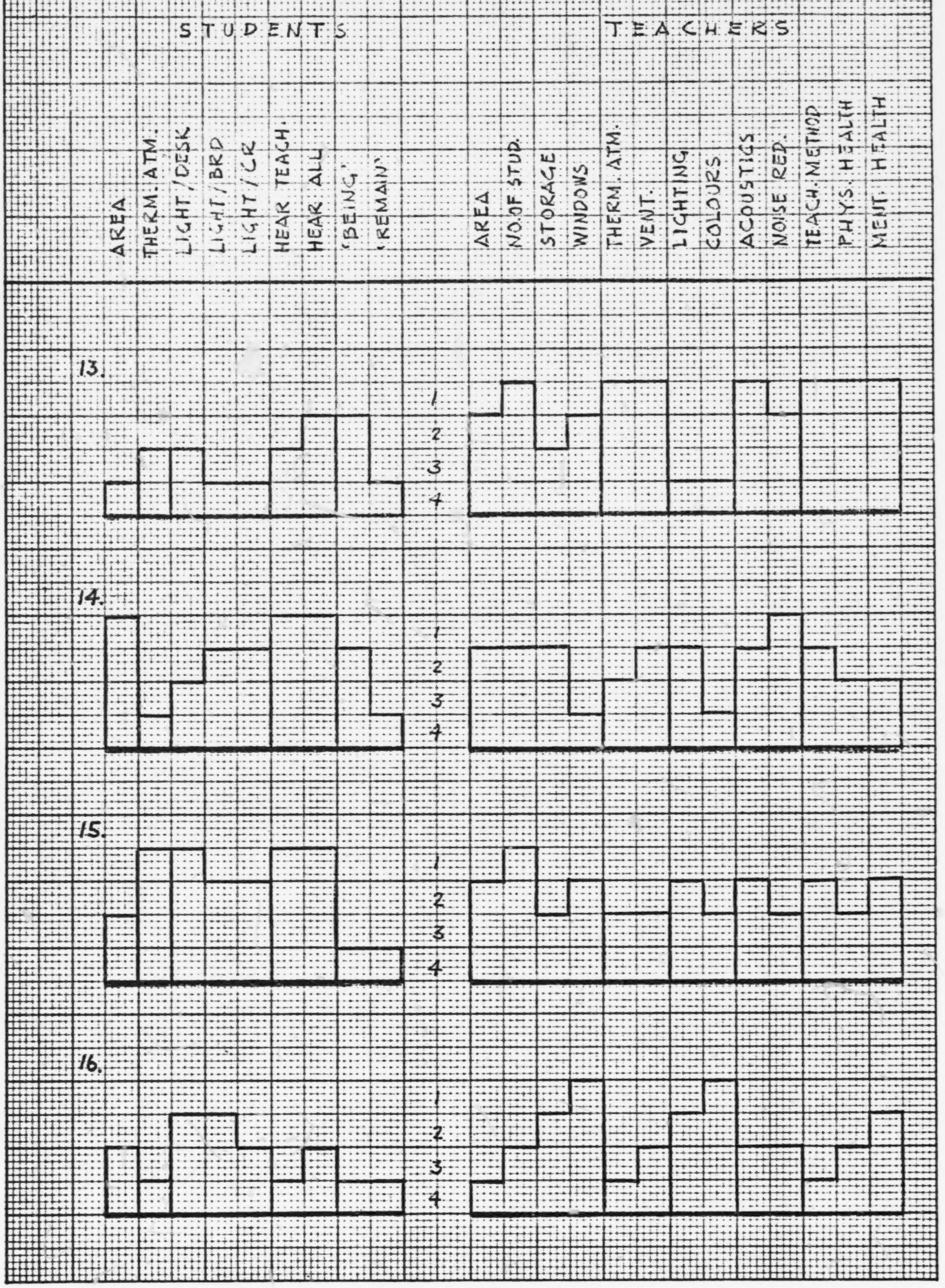
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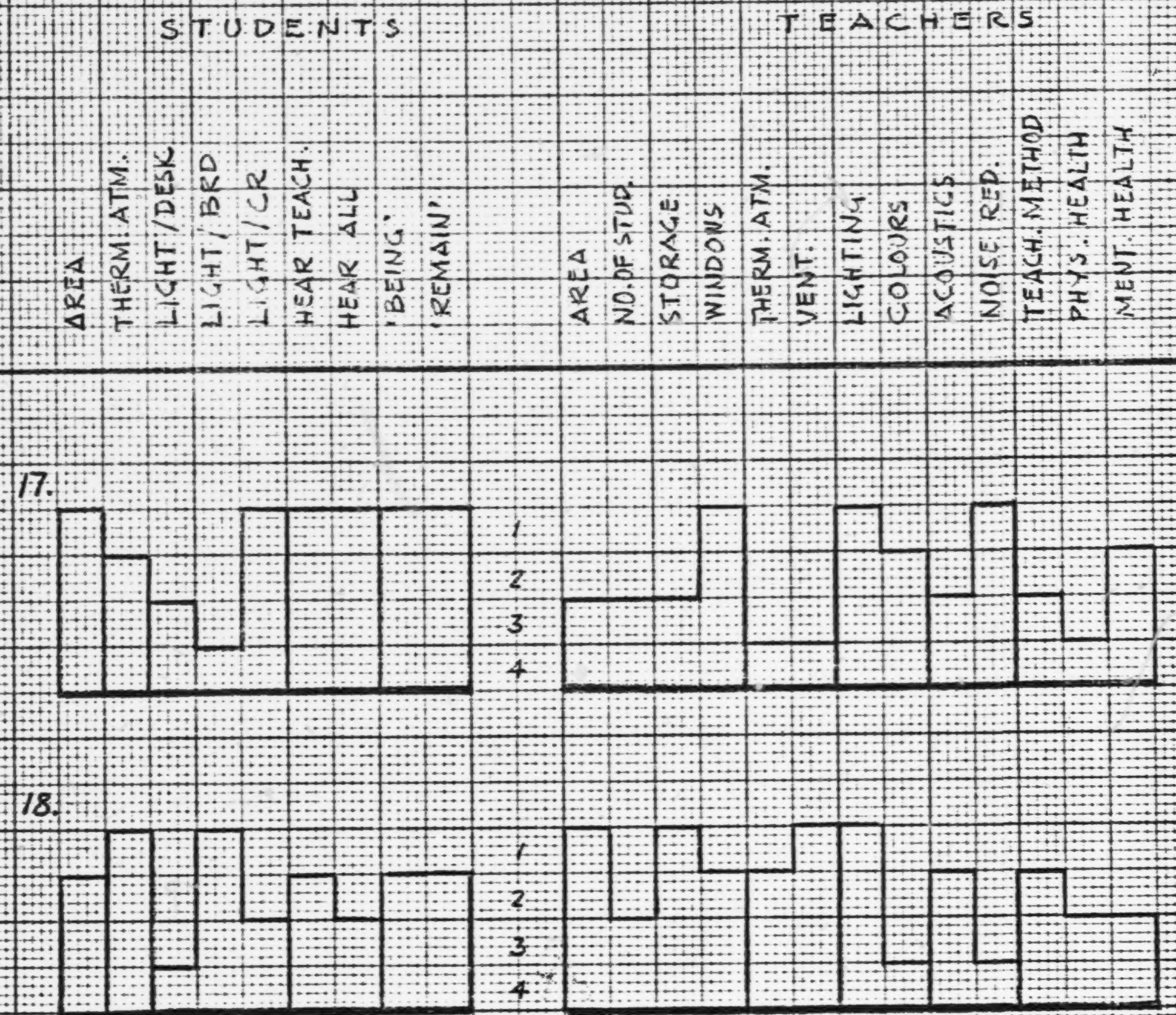
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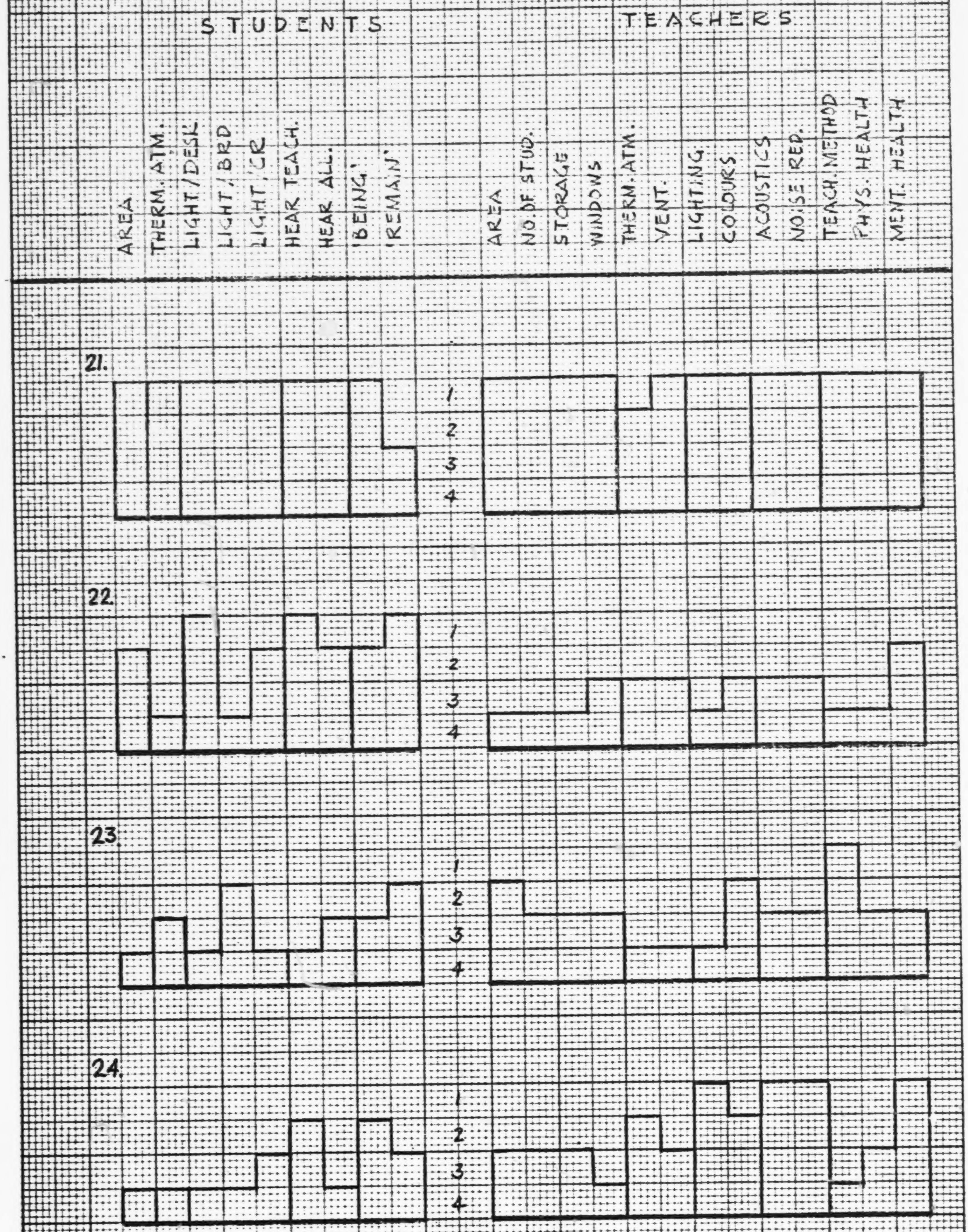
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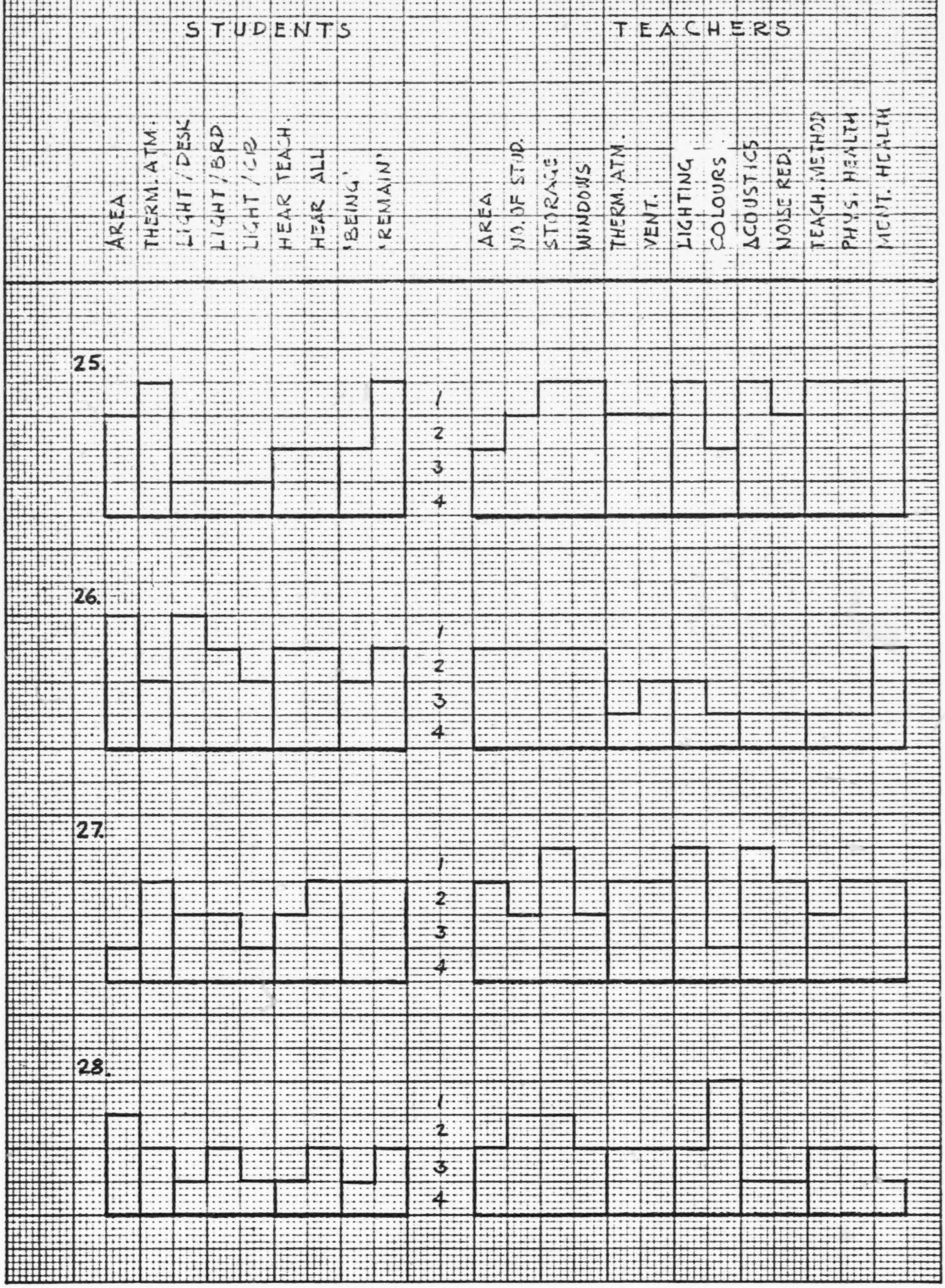
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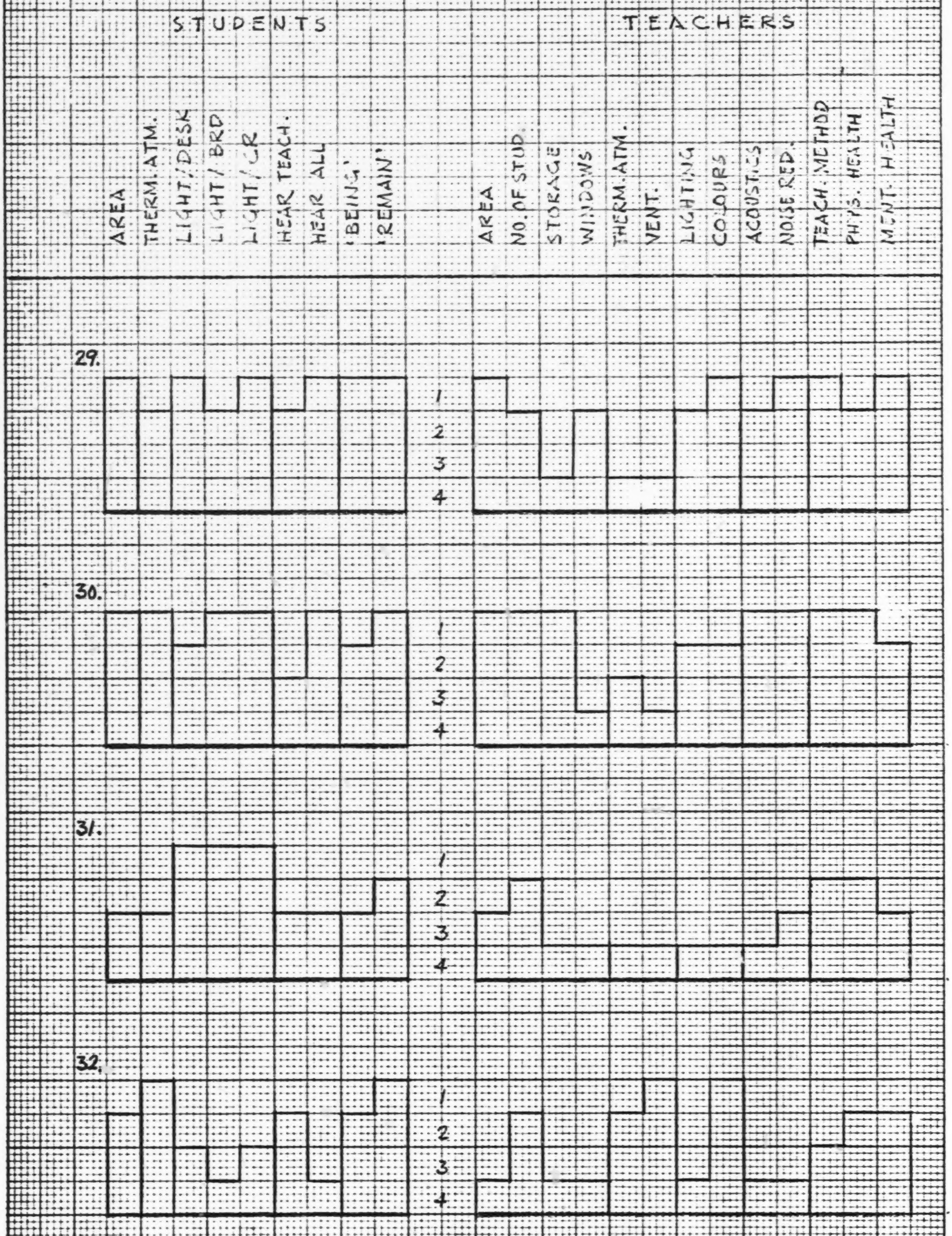
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2. THE SCHOOLS RANKED ACCORDING TO MAXIMUM POSITIVE RESPONSES

	ATTITUDES			ENVIRONMENTAL FACTORS			TOTAL		
Rank	Students	Teachers	Total	Students	Teachers	Total	Students	Teachers	Total
1st	29	13	25	21	2	21	21	10	21
2nd	19	10	29	30	10	2	29	21	29
3rd	25	25	13	29	21	30	30	13	30
4th	6	21	19	20	25	10	17	25	10
5th	17	30	4	15	30	29	14	2	25
6th	32	29	30	31	6	18	4	30	2
7th	27	20	21	14	18	20	6	29	18
8th	4	4	10	1	13	6	18	19	13
9th	18	19	32	2	19	15	11	20	6
10th	11	15	27	26	29	14	22	18	20
11th	22	31	18	17	20	25	31	6	19
12th	24	32	12	4	9	9	1	27	14
13th	14	27	14	18	3	8	2	15	4
14th	12	9	17	11	27	13	7	9	9
15th	9	12	9	7	24	19	9	3	15
16th	30	18	24	6	15	17	12	14	17
17th	23	14	22	22	14	4	25	24	27
18th	7	3	6	8	8	27	26	8	8
19th	13	8	31	9	5	26	15	4	12
20th	1	28	20	12	16	12	20	5	24
21st	2	24	15	10	17	24	32	12	22
22nd	31	22	28	32	12	16	19	16	32
23rd	21	17	8	25	4	22	27	17	31
24th	16	5	3	27	23	7	8	32	16
25th	28	16	11	16	26	5	24	22	26
26th	8	2	23	28	32	3	10	28	3
27th	3	6	2	13	22	31	13	23	7
28th	26	23	16	19	28	32	16	26	5
29th	15	7	7	5	7	11	28	31	11
30th	5	26	5	24	11	1	23	7	28
31st	10	11	26	23	31	28	5	11	23
32nd	20	1	1	3	1	23	3	1	1

The above figures refer to the number of schools as seen on the next page.

3. LIST OF SCHOOLS STUDIED

1.	BEACONHILL	Beaconsfield
2.	BEDFORD	Montréal
3.	CECIL NEWMAN	LaSalle
4.	CENTENNIAL PARK	Châteauguay
5.	GARDENVIEW	Saint Laurent
6.	GLENCOE	Montréal
7.	GREENDALE	Pierrefonds
8.	KEITH	LaSalle
9.	McLEARON	Pointe-aux-Trembles
10.	MILLAR	Saint Laurent
11.	REGINA CAELI	Pointe-Claire
12.	ROSLYN	Westmount
13.	RUSSEL	Mount Royal
14.	SAINT EDMUND'S	Beaconsfield
15.	SIR ARTHUR CURRIE	Montréal
16.	WENTWORTH	Côte-Saint-Luc

17.	ALPHONSE DESJARDINS	Montréal
18.	CHARLEVOIX	Montréal
19.	CENTRE ST. NORBERT	Chomedey
20.	FREDERIC-OZANAM	Montréal-Nord
21.	HENRI BEAULIEU	Saint Laurent
22.	JEAN DE BREBEUF	Jacques-Cartier
23.	JEAN-JACQUES OLIER	Montréal
24.	LA BROQUERIE	Boucherville
25.	MGR. DESCHAMPS	Pierrefonds
26.	NOTRE DAME DE L'ASSOMPTION	Ste-Thérèse de Blainville
27.	SAINT-ALBERT-LE-GRAND	Montréal
28.	SAINT-DONAT	Montréal
29.	SAINT-NOEL-CHABANEL	Saint-Michel
30.	SAINTE-ODILE	Montréal
31.	SAINT-REMI	Beaconsfield
32.	SAINT-RICHARD	Côte-Saint-Luc

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N.B.

In compiling the following references I had the opportunity and the privilege to receive information from many professors, architects and researchers from Canada and Abroad, from Provincial, Federal or foreign governmental departments, School Boards, Research Departments in various Academic and Non-Academic Institutions, Publishers of Magazines and Books, etc..

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Oc.1962, Fe.1963, My.1963, Oc.1963, Fe.1964, Sp.1964,
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XI- ADDENDA

Just before submission of the thesis the following references were found out:

from ERIC/CEF

Annotated Reference Lists

Locating Educational Facilities

The Maintenance of Educational Facilties

The Design and Construction of Libraries and Study Facilties

Standards foc Educational Facilties

Flexible Educational Facilities

Construction Costs of Educational Facilities

Safety Factors in Educational Facilties

Educational Specifications

Evaluating Educational Facilities

State-of-the-Art Papers

The Design, Development and Administration of Educational Facilties-A Conceptual Framework

Considerations in the Development and Use of Facilities for Independent Study

Occasional Papers

Environment for Learning - the 1970's

Legal Aspects of Educational Facilties

Time-Management Planning for Educational Facilties

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from The Environmental Research Foundation

MILIEU, newsletter, Topeka, Kansas, 1966-1969.

Reports by The Environmental Research Foundation:

Program I, *The Mental Health Care Environment - A Program of Research and Planning*

A. Investigation of Mental Hospital Nursing Station Design on Aspects of Human Behavior (17 pages, mimeo).

B. Patterns of Group Interaction Behavior in Three Architecturally Different Psychiatric Treatment Environments (244 pages, mimeo).

C. In-Use Evaluation of Psychiatric Faciltiy (4 pages, reprint Aug.'66 Progressive Architecture).

D. Architectural Modification for Functional Change in a Vintage Inpatient Cottage Ward Building.

Program II, *Housing Environment and Behavior - A Research Basis for Urban Policy*

A. Selected Social Characteristics and Multi-Family Living Environment - A Pilot Study (36 pages, mimeo).

Program III, *Human Movement Behavior - A study of Architectural Environment*

A. Human Movement and Architecture (4 pages, reprint May 1967 Transaction).
B. Human Movement and Preference (17 pages, mimeo).

C. Footsteps as a Measure of Human Preference (117 pages, mimeo)

D. Human Movement as a Function of Color Stimulation (30 pages, mimeo).

- Description of the Organization of The Environmental Research Foundation - *The Urgent Environment*,

* *

conditions and this is, of course, the theme of this thesis, but one cannot help wondering how well the first class teacher can overcome physical handicaps.

Page 9 ✓ First paragraph. "requiring to mention" should be "mentioning."
✓ Middle section, line 6, "small groups of isolation" should be "small isolated groups."

26 Conclusion.

It is not surprising that teachers are least critical about Mental Health. Mental health is a very difficult field in which to make judgements.

PART III Cultural, Social and Other Factors

Page 2 Second paragraph. As I have already commented, I disagree with the use of the words "ethnic groups" in the sense of French and English applied to students in schools.

5 Attitudes. Their desire to remain in the classroom may well be in part due to a less attractive home environment or fewer communal recreational facilities in lower income level districts.

12 Are French-speaking students and teachers more ready to accept the status quo than their English-speaking counterparts?

23 I wonder whether Part III was worth doing. It might have been more interesting to have compared the schools under different Boards or Commissions, e.g.,

Protestant School Board of Greater Montreal
Lakeshore Regional Board
Montreal Catholic School Commission
other Catholic Commissions.

PART IV

The tabulation of most liked and least liked features gives food for thought and further research. These conclusions should be available to architects, engineers, decorators and, I hope, [illegible] responsible for the building of new schools at Quebec and on local boards.

EPILOGUE

Page ✓1 Paragraph 1.5 "capable to" should be "capable of adapting."
Paragraph 1.6 Entirely understandable! The awareness of physical health depends on the teacher's sympathetic understanding of each student.

✓ 2 Paragraph 1.8, line 4. "surroundings so that the desired activities can take place within it." is grammatically more acceptable.

✓ 4 Paragraph 3.1, line 3, "to have" should be "of having"

Teaching methods and type of learning are decided at the School Board level. On the Protestant side there has always been consultation through committees set up at the Board level or through committees of the Provincial Association of Protes-

Notes on Mr. Artinian's thesis "The Elementary School Classroom."

These notes are in part suggestions for minor improvements and in part comments that occurred to me as I read and that might interest the author.

Page III Abbreviations

Several anomalies appear in this list:

S = sunny
S= Suburban, later Sub = Suburban
U = upper income bracket
U = urban, later: Urb = urban
A = acrylic shade, also A = adequate
F = fluorescent, later: F = forced air
L has three meanings.
M = medium, also M = middle income
St = student(s), later Stud = student(s)

[illegible]

A minor point but perhaps no abbreviations are better than confusing ones.

PR Pg: 1 Last paragraph, line 2. "Be" should be "are." [illegible]
✓2 Line 1, "Is" should be "has been." [illegible]
Second paragraph, lines 3-7. Quotation marks should close after nothing," not after mind." [illegible]
✓4 Third paragraph, line 2. Add "could" after architects.
✓5 Second paragraph. Title: "Choise" should be "Choice."

I do not think the words Ethnic Groups are used correctly. Ethnic is generally used to refer to racial origin. There are a variety of ethnic groups in French language and English language schools, e.g., Greeks, Italians, Czechs, Poles, Rumanians, Irish, English, Egyptians, etc. Schools are based on language, English and French, and religion, Catholic and Protestant.

NOTE ABOVE.

6 Last paragraph. Appendixes should be Appendices. [illegible]

PART I The Spatial Environment

Page 1 Nine lines from the bottom, "to remark" should be "remarking." why?
✓7 Third paragraph. "Children would be expected to show" is better.
✓8 Last paragraph. Insert "while" between "students" and "some mentioned."
✓11 Second paragraph. Omit "a" in line 2 and change "it" to "them" in line 4. [illegible]
Third paragraph, "to mention" should be "mentioning." why?
✓13 The first, second and last paragraphs are clumsily worded.
Third paragraph. "Confinements" should be "Confinemen~~ts~~"

tant Teachers. There has been less consultation on the Catholic side. In fact, if you have followed the salary negotiations, you will have seen that methods for teacher consultation is one of the areas most in dispute.

Page 8 When the new Science building was built at Lower Canada College in 1959, members of the science staff made a scale model of the laboratories. They were consulted on all points by the architects. They also sought advice from a leading specialist in thehigh schools. The same consultative procedure was repeated when thesecond gymnasium was built three years later. This is possible in a small school with a core of permanent staff. One of the problems in big school boards is theconstant shifting of teachers and principals.

I would like to have heard a little more of Greendale School where principal and teachers are experimenting with the non-graded, open classroom concept.

On the protestant side, the most interesting recent construction has been done by Boards off the island: Eastern Townships Regional Board, comprehensive schools at Richmond and Lennoxville, Chateauguay Valley Regional Board, similar schools at Ormstown and Chateauguay, and new bilingual comprehensive school at Cowansville.

I do not know much about the Catholic side except that more new schools have been built by Catholic Boards than by Protestant . There was greater need for them!

There is a department of building in the Ministry of Education at Quebec which lays down specific norms and detailed regulations on all points even to desks and chalkboards.

Page 9 Third paragraph, line 5, after comma " and will therefore require."

10 And additional funds to improve the ratio of teachers to students among other things. When some of the "new" schools were built in the 1950's, there was considerable discontent among the teachers. Money was available to build palatial schools but not for higher salaries. A well paid, contented staff in a mediocre building is more to be desired than an unhappy staff in a palatial building.

Page 11 Second paragraph, "reverred" should be "revered."

Notes on Mr. Artinian's thesis "The Elementary School Classroom."

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Page III Abbreviations

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M = medium, also M = middle income
St = student(s), later Stud = student(s)

No confusion could result in the context of each abbrev.

A minor point but perhaps no abbreviations are better than confusing ones.

PR Pg. 1 Last paragraph, line 2. "Be" should be "are." [illegible]
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PART I The Spatial Environment

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8 Last paragraph. Insert "while" between "students" and "some mentioned."
11 Second paragraph. Omit "a" in line 2 and change "it" to "them" in line 4.
Third paragraph, "to mention" should be "mentioning." [illegible] ?
13 The first, second and last paragraphs are clumsily worded.
Third paragraph. "Confinements" should be "Confinement."

The Thermal Environment

Page 14 First paragraph. "Sometimes" should be "some time."
17 10. "Not any" should be "No."
20 Second Paragraph. Clumsily worded.

The most interesting conclusion in this section is found on Page 19, Section 4. The effect of various heating systems should be followed up. Do modern school buildings have air conditioning? I worked in the new Administration Building at McGill in which there is a constant temperature all year. The activist classroom needs less heat than the classroom in which the students stay put all the time.

The Luminous Environment

Page 24 Second paragraph, line 2. Insert "by the fact" after "explained."
Third paragraph, line 2, becuase = because.
line 7, "are adapted" should be "can adapt themselves."
26 6. Effect of Area, line 2, nor = not.
30 2. Comments on Lighting, line 1, "that lighting requires improvement."
31 8. Mutual Effects... line 1. Nor any = No.
32 13. Comments on Colours, lines 1 and 2, "shall" should be "will" in each case.

I would have expected more criticism of the lighting, but perhaps more progress has been made in this field than in the thermal environment.

The author does not indicate what is a satisfactory foot-candle reading either at the desk level or on the chalkboard.

The question of colours is interesting. Are the colours in the classroom chosen by men or women? It is my experience that women are far more sensitive to colour than most men.

The Aural Environment

Page 39 4. Comments on Acoustics, third paragraph. What does internalize mean? I cannot find the word in the Oxford Concise Dictionary or Modern English Usage.

The author does not make the meaning of Noise Reduction clear. Does he mean noise from outside the classroom?

The findings on carpets are interesting. These are generally considered the latest thing in helping to reduce noise!

Conclusions

Page 57 Third paragraph. "related with" should be "related to."
Eighth paragraph. "relationship with" should be "relationship to."

PART II Attitudes and the Environment

The answers indicate that/students benefit from better conditions and this is, of course, the theme of this thesis, but one cannot help wondering how well the first class teacher can overcome physical handicaps.

Page 9 / First paragraph. "requiring to mention" should be "mentioning."
10 ✓ Middle section, line 6, "small groups of isolation" should be "small isolated groups."
26 Conclusion.

It is not surprising that teachers are least critical about Mental Health. Mental health is a very difficult field in which to make judgements.

PART III Cultural, Social and Other Factors

Page 2 Second paragraph. As I have already commented, I disagree with the use of the words "ethnic groups" in the sense of French and English applied to students in schools.
5 Attitudes. Their desire to remain in the classroom may well be in part due to a less attractive home environment or fewer communal recreational facilities in lower income level districts.
12 Are French-speaking students and teachers more ready to accept the status quo than their English-speaking counterparts?
23 I wonder whether Part III was worth doing. It might have been more interesting to have compared the schools under different Boards or Commissions, e.g.,

Protestant School Board of Greater Montreal
Lakeshore Regional Board
Montreal Catholic School Commission
other Catholic Commissions.

PART IV

The tabulation of most liked and least liked features gives food for thought and further research. These conclusions should be available to architects, engineers, decorators and, I hope, [illegible] responsible for the building of new schools at Quebec and on local boards.

EPILOGUE

Page ✓1 Paragraph 1.5 "capable to" should be "capable of adapting."
Paragraph 1.6 Entirely understandable! The awareness of physical health depends on the teacher's sympathetic understanding of each student.
✓ 2 Paragraph 1.8, line 4. "surroundings so that the desired activities can take place within it." is grammatically more acceptable.
✓ 4 Paragraph 3.1, line 3, "to have" should be "of having"

Teaching methods and type of learning are decided at the School Board level. On the Protestant side there has always been consultation through committees set up at the Board level or through committees of the Provincial Association of Protestant Teachers. There has been less consultation on the Catholic side. In fact, if you have followed the salary negotiations, you will have seen that methods for teacher consultation is one of the areas most in dispute.

Page 8 When the new Science building was built at Lower Canada College in 1959, members of the science staff made a scale model of the laboratories. They were consulted on all points by the architects. They also sought advice from a leading specialist in thehigh schools. Thesame consultative procedure was repeated when thesecond gymnasium was built three years later. This is possible in a small school with a core of permanent staff. One of the problems in big school boards is theconstant shifting of teachers and principals.

I would like to have heard a little more of Greendale School where principal and teachers are experimenting with the non-graded, open classroom concept.

On the protestant side, themost interesting recent construction has been done by Boards off the island: Eastern Townships Regional Board, comprehensive schools at Richmond and Lennoxville, Chateauguay Valley Regional Board, similar schools at Ormstown and Chateauguay, and new bilingual comprehensive school at Cowansville.

I do not know much about the Catholic side except that more new schools have been built by Catholic Boards than by Protestant . There was greater need for them!

There is a department of building in the Ministry of Education at Quebec which lays down specific norms and detailed regulations on all points even to desks and chalkboards.

Page ✓9 Third paragraph, line 5, after comma " and will therefore require."

10 And additional funds to improve the ratio of teachers to students among other things. When some of the "new" schools were built in the 1950's, there was considerable discontent among the teachers. Money was available to build palatial schools but not for higher salaries. A well paid, contented staff in a mediocre building is more to be desired than an unhappy staff in a palatial building.

Page ✓11 Second paragraph, "reverred" should be "revered."